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Programme

Thursday 11th October 2012

Session 1	*Interventional Cardiology* Chairs: Prof. David Foley & Dr. Colm Hanratty
18.30–21.00	Case Reviews
Session 2	*Electrophysiology* Chairs: Prof. David Keane & Dr. Joe Galvin
18.30–21.00	Case Reviews/Presentations

Friday 12th October 2012

08.45	Registration
08.45–09.00	Welcome from Dr Carol Wilson, President
Session 3	*Imaging* Chair: Dr. Nicola Johnston
09.00–09.30	Assessment of Aortic Valve Stenosis Dr Simon Ray Wythenshawe Hospital, Manchester, UK
09.30–10.30	Oral Presentations
1.	The Yield of Stress Perfusion CMR in Diabetic Patients Ó h-Icí D, Moynagh A, Hovasse T, Unterseeh T, Louvard Y, Morice MC, Garot J, Institut Cardiovasculaire Paris Sud, Hôpital Jacques Cartier, 6 avenue du Noyer Lambert, 91 300 MASSY, France
2.	Diagnosis of Left Ventricular Non Compaction by Cardiovascular Magnetic Resonance Imaging in a Group of Patients with Left Ventricular Systolic Dysfunction Noad, RL, McKeag NA, Johnston, N, Horan, P, Harbinson M, Dixon LJ Belfast Heart Centre, Belfast
3.	Giant Cell Myocarditis in the CMR Era Leong T Harefield Hospital, Royal Brompton & Harefield NHS Foundation Trust, London, UK
4.	A Method of Studying the Course of Myocardial Ischemia and Reperfusion in Rats in Vivo [1]O h-Ici D, [2]Dietrich T, [1]Kuehne T, [1]Messroghli D [1]Department of Congenital Heart Disease and Pediatric Cardiology, Deutsches Herzzentrum Berlin, Augustenburger Platz, Berlin 13353, Germany [2]German Heart Center Berlin, Department of Cardiology, Berlin, Germany

5. Cigarette Smoking: Relationship with Inflammation, Arterial Stiffness, and Subclinical Atherosclerosis. The Multi-Ethnic Study of Atherosclerosis (MESA)
McEvoy JW, Blaha MJ, Lima JAC, Bluemke DA, Hundley WG, Min JK, Shaw LJ, Lloyd-Jones DM, Barr RG, Budoff MJ, Blumenthal RS, Nasir K
John Hopkins Hospital, Baltimore, MD, USA

6. Cardiac CT for the Assessment of Pain and Plaque: The 90 day Results of a Randomised Control Trial
McKavanagh P, Lusk L, Ball P, Trinick T, Duly, Walls G, Harbinson M,
McQuillan CL, Shevlin S, Alkali M, Donnelly P
Ulster Hospital, Dundonald, Belfast

10.30–11.00 *Poster Presentation*

Coffee/Exhibition

7. Angiotensin-Converting Enzyme Inhibition and Non-Dipping Hypertensives—Targeting Night-Time Blood Pressure to Improve Ventricular Function
Voon V, Ledwidge M, O'Hanlon R, McDonald K
St. Vincent's University Hospital, Elm Park, Dublin

8. Wavelet Analysis of Blood Flow Velocity Waveforms Detects Differences in the Retro-Bulbar Circulation Between Heart Failure Patients and Controls
[1]Lyons K S, [2]McCann A, [1]McVeigh G E, [1]Harbinson M T,
[1]Centre for Vision and Vascular Science, Queens University Belfast
[2] Medical Physics Agency, Belfast Health and Social Care Trust

9. High Sensitivity Troponin T is Detectable in Most Patients with Clinically Stable Heart Failure
[1]Lyons KS, [2]McKeeman G, [1]McVeigh G, [1]Harbinson MT
[1]Centre for Vision and Vascular Science,
[2]QUB, Belfast Link Labs, Belfast HSC Trust

10. Potentially Inappropriate Medicines in Heart Failure
Bermingham M, McDonald K, Ledwidge M
Heart Failure Unit, St. Vincent's University Hospital, Dublin and School of Medicine and Medical Science,
University College Dublin, Dublin

11. Surgical Repair of Ischaemic Ventricular Septal Defects within 9 days of a Myocardial Infarct did not Lead to any Survivors in a 13 year Series of 26 Patients
Beattie G, Martel G, MacGowan S, Graham A
Royal Victoria Hospital Belfast, Belfast

12. Coronary Computed Tomography in Acute Chest Pain in the Emergency Department: Appropriate Patient Selection Informed by Multicenter Randomized Control Trials
Groarke J
Brigham and Women's Hospital, Boston, Ma, USA

13. Variation in Measures of Right Ventricular Structure and Function Performed in Standard versus Modified Apical Views
Groarke J, Rivero J, Cheng S
Brigham and Women's Hospital/Harvard Medical School, Boston, Ma, USA

14. Cardiovascular MRI Findings in an Asymptomatic Male HIV Patient Population
Morgan RB, Loy A, O' Dea S, Takacs A, Mulcahy F, Meaney J, Daly CA
St. James's Hospital, Dublin

15. Reduced Right Ventricular Myocardial Strain in the Elite Athlete is not a Consequence of Myocardial Damage
[1]King GJ, [2]Murphy R, [2]Almuntaser I, [1]Mc Loughlin B, [1]Livingston A, [1] Nevin S, [1]Clarke JC
[1]Eagle Lodge Medical Centre O' Connell Avenue Limerick
[2]St James Hospital Cardiology Department, Dublin

16. The Use of a Novel Iterative Reconstruction Algorithm CT to Assess Stable Chest Pain with: Results from the CAPIR study
McKavanagh P, Lusk L, Ball P, Trinick T, Duly E, Walls G, Harbinson M, McQuillan CL, Shevlin S, Alkali M, Donnelly P
Department of Cardiology, Ulster Hospital, Dundonald, Belfast

17. Impact of Coronary Computed Tomographic Angiography Results on Patient and Physician Behavior in a Low-Risk Population
McEvoy JW, Blaha MJ, Nasir K, Yoon YE, Choi EK, Cho IS, Chun EJ, Choi SI, Rivera JJ, Blumenthal RS, Chang HJ
John Hopkins Hospital, Baltimore, MD, USA

Session 4 *Heart Failure/Prevention*
Chair: Dr. Pat Nash

11.00–11.30 "ABPM is Now Mandatory for Good Clinical Practice"
Prof. Eoin O'Brien
Prof. of Molecular Pharmacology
Conway Institute, University College Dublin

11.30–12.30 Oral Presentations

18. Community Management of Cardiovascular Risk in Stage A/B Heart Failure: Six Month Follow up of the COMPARE-HF Cohort
Horgan S, Tallon E, Dawkins I, Conlon C, Watson C, Baugh J, Whyte K, Miwa S, McDonald K, Ledwidge M
St Vincent's University Hospital, Dublin

19. The Hidden Truth: Stage B Heart Failure Among Diabetics and Overweight
Murtagh G, O' Connell J, Dawkins I, King T, Griffin J, Tallon E, O' Hanlon R, Patel A, Ledwidge M, Mc Donald KM
St Vincent's University Hospital

20. Reduced Absolute Myocardial Blood Flow is Associated with Worse Diastolic Dysfunction
Groarke JD, Murthy VL, Naya M, Di Carli MF, Shah AM
Brigham and Women's Hospital, a teaching affiliate of Harvard Medical School, Boston, USA

21. Diabetic Hearts Show Increased Iysyl Oxidase Expression
Horgan S, Watson C, Collier P, Ledwidge M, McDonald K, Baugh J
The Conway Institute, University College Dublin, Dublin

22. Identification of Serum Biomarkers that Reflect Progressive Cardiac Remodelling
Watson C, Collier P, Horgan S, Conlon C, O'Hanlon R, Ledwidge M, Baugh J, McDonald K
UCD Conway Institute of Biomolecular and Biomedical Research, Belfield, University College Dublin, Dublin

23. Assessing Psychological Well-Being in a Population Undergoing Screening for Inheritable Cardiac Diseases
McQuade C, McShane C, McGorrian C, O'Donnell C, O'Neill J, Keelan E, Galvin J, Mahon NG, Codd M
Family Heart Screening Clinic, Mater Misericordiae University Hospital, Dublin

12.30–14.00 *Lunch/Exhibition*

Session 5 *Structural Heart Disease*
Chair: Dr. Andrew Maree

14.00–14.30 Invited Speaker
Prof. Alain Carpentier
Hopital Europeen Georges Pompidou, Paris, France

14.30–15.30 Oral Presentations

24. Long Term Prevention of Recurrent Cerebrovascular Events with Transcatheter Patent Foramen Ovale Closure- Findings in Contrast to the Closure I trial
Margey R, Elmariah S, Renfigo-Moreno P, Inglessis I, Palacios IF
Structural Heart Disease, Interventional Cardiology and Structural Heart Disease, Division of Cardiology, Massachusetts General Hospital, Boston, USA

25. Thrombus on Left Atrial Appendage Occluder Device: Periprocedural Caution
Waterhouse DF, Mehta AG, Abidin NZ, Kennedy MW, Alqaseer M, Asegom SD, Foley D, McAdam B
Beaumont Hospital, Beaumont, Dublin

26. Catecholamine-Induced Heart Hypertrophy: Impact on Cardiac Function
[1]Lainis F, [2]Buckley MM, [2]Johns EJ
[1]School of Medicine & [2]Department of Physiology, University College Cork, Cork

27. Cost Benefit Analysis of Transcatheter Aortic Valve Implantation (TAVI) Compared to Conventional Medical Treatment Including Valvuloplasties in Patients with Severe Aortic Stenosis (AS)
[1]Neoh S, [2]Mahon C, [3]Kiat C, [1]Galvin B, [2]Sugrue R, [3]O'Neill C, [1]Crowley J, [2]Foley B, [2]Crean P, [1]Sharif F
[1] University College Hospital Galway
[2] St. James's Hospital, Dublin
[3] AMNCH, Dublin

28. Conventional Aortic Valve Replacement Surgery in Patients not Suitable for Trans- Catheter Aortic Valve- Outcome Assessment
Beattie R, Booth K, Spence M, Jones MJ
Royal Victoria Hospital, Belfast

29. Current Demand for Surgery for Rheumatic Heart Disease in Northern Ireland
Umar Imran Hamid, Alastair Graham
Royal Victoria Hospital, Belfast

15.30–16.00 *Poster Presentations*

Coffee/Exhibition

30. Percutaneous Closure of Patent Foramen Ovale for Secondary Prevention of Paradoxical Embolus: Beating the Odds
Galvin M, James S, Waterhouse DF, Abidin NZ, Asgedom SD, McAdam B, Foley D,
Department of Interventional Cardiology and Department of Interventional Echocardiography, Beaumont Hospital, Dublin

31. Incidence of Cardiomyopathy in Heamochromatosis; are We Cautious Enough?
Asaad Khan, G. Kaur, Z. Khan, N. Papaneja,
C. Quigley
Wexford General Hospital, Wexford

32. Non-Cerebrovascular Systemic Arterial Embolic Events due to Paradoxical Embolization via Patent Foramen Ovale (PFO)
[1+2] Margey R, [1]Elmariah S, [1]Hynes BG, [1]Renfigo-Moreno P, [2]Schainfeld R, [2]Jaff M R, [1]Inglessis I, [1]Palacios IF
[1]Interventional Cardiology and Structural Heart Disease, Division of Cardiology, Massachusetts
[2]Vascular Medicine, Division of Cardiology, Massachusetts General Hospital and Harvard Medical School,
Boston, Mass

33. Trans-Catheter Aortic Valve Implantation: Adverse Outcomes of 120 Cases in 2 Centres
[1]Sugrue R, [1]Teehan S, [1+2]Murphy RT, [1]Lynch G, [2]McCarthy J, [1]Tolan M, [2]Quinn M, [1]Foley B, [1+2]Crean P
[1]Departments of Cardiology and Cardiothoracics, St James' University Hospital, Trinity College, Dublin
[2]Blackrock Clinic, Dublin

34. Radiation Exposure during Transcatheter Aortic Valve Implantation (TAVI) Procedures
Sharma D, Ramsewak A, O'Conaire S, Spence M, Manoharan G
Royal Victoria Hospital, Belfast

35. Hypertension Patterns Post Aortic Coarctation Repair
Canniffe C, Walsh K
Mater Misericordiae Hospital, Dublin

36. Perceived Barriers to Exercise in a Cardiovascular Primary Prevention Programme
Tuohy S, Sharma K, O'Conghaile A, Windle J, Gibson I, Flaherty G, Crowley J
University College Hospital, Galway

37. Cigarette Smoking: Association between Inflammation, Subclinical Atherosclerosis and Cardiovascular Events
McEvoy JW, Blaha MJ, Lima JAC, Bluemke DA, Hundley WG, Min JK, Shaw LJ, Lloyd-Jones DM, Barr RG, Budoff M J, Blumenthal RS, Nasir K
Johns Hopkins Hospital, Baltimore, USA

38. Impact of a Phase 2 Cardiac Rehabilitation Programme on Exercise Performance Across Patient Subgroups: Who Benefits Most?
Neylon A, McGorrian C, Gallagher A, Murphy A, Blake G, Mahon N, McCann H, Sugrue D
Department of Cardiology, Mater Misericordiae University Hospital, Dublin

Session 6 *Young Investigator Award*
Chair: Dr Carol Wilson
Judges: Dr. Simon G. Ray, Dr. Peter Kearney & Dr. Angie Brown

16.00–17.00 Oral Presentation

39. Patients with Hypertension and Heart Failure with Preserved Ejection Fraction Present with Elevated Inflammatory and Alternative Monocyte/Macrophage-Specific Markers in their Peripheral Circulation
Glezeva N, Voon V, Watson C, Ledwidge M, McDonald K, Baugh J
Conway Institute, UCD, Dublin

40. A Novel Biomarker and Potential Treatment for Diastolic Dysfunction and Heart Failure
Horgan S, Watson C, Collier P, Ledwidge M, McDonald K, Baugh J
The Conway Institute, UCD, Dublin

41. Carotid Intima-Media Thickness Independently Predicts Significant Coronary Artery Disease and is as Good as a Bank of Novel Risk Markers
Leong T
Adelaide & Meath Hospital, Tallaght, and St. James's Hospital, Dublin

42. Cardiovascular Magnetic Resonance of Myocardial Edema Using a Short Inversion Time Inversion Recovery (STIR) Black-Blood Technique: Diagnostic Accuracy of Visual and Semi-Quantitative Assessment
[1]O h-Ici D, [2]Ridgway JP, [1]Kuehne T, [1]Berger F, [3]Plein S, [4]Sivananthan M, [1]Messroghli DR
[1]Department of Congenital Heart Disease and Pediatric Cardiology, Deutsches Herzzentrum Berlin, Augustenburger Platz 1, Berlin 13353, Germany
[2] Medical Physics, Leeds General Infirmary, Great George Street, Leeds UK
[3] Leeds Institute, UK

17.00–17.30 *ICS AGM*

17.45–18.45 *Stokes Lecture*
"Next Monday, you are Minister for Health. Now what?"
Prof Ian Graham
Trinity College Dublin

19.45 Reception

20.30 Annual Dinner

Saturday 13th October 2012

08.00–09.15 Cardiology Education and Training Update
09.00–9.30 Cardiovascular Research in Ireland; evolution & role of the National Cardiovascular & Stroke Research Network (NCSRN)
Prof. Dermot Kenny
Cardiovascular Biology, Clinical Research Centre, Royal College of Surgeons in Ireland, Dublin

09.30–09.40 Brian McGovern Travelling Fellowship 2010 Report
Dr. Ronan Margey

Session 7 *Revascularisation*
Chair: Dr. John Riddell

09.40–10.00 "Get if off your chest"
Three presentations on Topical Subjects

10.00–11.00 Oral Presentations

43. Impact of Stent Overlap on Long-Term Clinical Outcome in Patients undergoing Newer-Generation Drug-Eluting Stent Implantation
O'Sullivan CJ, Stefanini GG, Pilgrim T, Räber L, Taniwaki M, Büllesfeld L, Khattab AA, Nietlispach F, Wenaweser P, Meier B, Windecker S
Swiss Cardiovascular Centre, Bern University Hospital, Bern, Switzerland

44. Contemporary Predictors in Successful PCI of Chronic Total Occlusions
Leong T
Institut Cardiovasculaire Paris Sud, Paris, France

45. Long-term Clinical Outcomes of Percutaneous Coronary Intervention with Drug-Eluting Stents in Patients with Mechanical Heart Valves
O'Sullivan CJ, Moschovitis A, Zanchin T, Stortecky S, Stefanini GG., Pilgrim T, Räber L, Taniwaki M, Büllesfeld L, Khattab AA, Nietlispach F, Wenaweser P, Meier B, Windecker S
Swiss Cardiovascular Centre, Bern University Hospital, Bern, Switzerland

46. Radial Artery Occlusion
M Dooley, M Spence, M Roberts
Belfast Health and Social Care Trust, Belfast

47. Optical Coherence Tomography (OCT) Guided Assessment of Coronary Intervention
Hillery P, Waterhouse DF, Abidin NZKZ, Asgedom SD, McAdam B, Foley DP
Beaumont Hospital, Beaumont, Dublin

48. The Changing Profile of Patients Undergoing Urgent Coronary Artery Bypass Surgery in the Primary Percutaneous Intervention Era
R Beattie, C Wilson, ANJ Graham
Royal Victoria Hospital, Belfast

11.00–11.30 *Poster Presentations*

Coffee/Exhibition

49. Myocardial Tissue Hypoxia is Associated with Changes in the Epigenome
Watson C, Neary R, Collier P, Tolan M, Ledwidge M, McDonald K, Baugh J
UCD Conway Institute of Biomolecular and Biomedical Research, Belfield, University College Dublin

50. Refining Transcatheter Left Atrial Appendage Closure: Eliminating the Anaesthestist and Reducing the Cost
Waterhouse DF, Kennedy MW, Asgedom SD, Neylon A, Alqaseer M, McAdam B, Foley DP
Department of Cardiology, Beaumont Hospital, Dublin

51. Incidence and Outcome of Re-entry Injury in Redo Cardiac Surgery
Hamid UI, Chi San Leung S, McGrath Soo L, Graham A
Royal Victoria Hospital Belfast, Belfast

52. Radial Approach To CTO Re-canalisation is as Successful and Safer Than Femoral : Single Centre Observational Study
Asgedom SD, Bjornsstad PM, Patten R, McAdam B, Sheahan R, Foley DP
Beaumont Hospital, Beaumont, Dublin

53. An Audit of Acute Kidney Injury (AKI) Following Contrast Coronary Angiography
Connolly M, Mc Eneaney D, Harbinson M, Morgan N
Cardiovascular Research, Craigavon Cardiac Centre, Southern Trust, NI

54. Long-Term Survival of Patients Successfully Discharged Following Aborted Out of Hospital Cardiac Arrest
Keaney J, Cuddy S, Browne L, Hanley A, O'Sullivan J, Mahon N, Keelan E, McGorrian C, Galvin J
Mater Hospital Dublin

55. Utility of Highly-Sensitive Cardiac Troponin I as a Marker of Disease in Hypertrophic Cardiomyopathy
[1,2]McGorrian C, [3]Lyster S, [4]Tarrant H, [2]Codd M, [5]Doran P, [4]Fitzgibbon M, [1,6]Galvin J, [1]Mahon NG
[1]Department of Cardiology, Mater Misericordiae University Hospital; [2]UCD School of Public Health, Physiotherapy and Population Science, UCD; [3]UCD School of Biomolecular and Biomedical Sciences, UCD; [4]Department of Clinical Biochemistry, Mater Misericordiae University Hospital; [5]UCD Clinical Research Centre, Mater Misericordiae University Hospital; [6]Department of Cardiology, Connolly Hospital Blanchardstown

56. Implications of Following New NICE Guidance on Pts Presenting to the Rapid Assess Chest Pain Clinic
Shevlin S, Johnston N, Dougon J
Royal Victoria Hospital, Belfast

57. Pericardial Effusion Associated with Neoadjuvant Chemoradiation for Oesophageal Cancer at a Tertiary Referral Centre—An Eight-Year Experience
Sugrue R, Fitzgerald C, Molony P, O'Hare D, McCormack O, Ravi N, Murphy R, Daly C, Reynolds JV
Departments of Upper Gastrointestinal Surgery and Cardiology
St James University Hospital, Trinity College, Dublin

Session 8 *Electrophysiology/General Cardiology*
Chair: Dr. Donal Murray

11.30–12.00 Invited Speaker
Prof. Michael Joy, OBE
Professor in Clinical Cardiology, University of Surrey

12.00–13.00 Oral Presentations

58. A Comparative Cost Impact Study of Diamond Forrester and Coronary Calcium
McKavanagh P, Lusk L, Ball P, Trinick T, Duly E, Walls G, Harbinson M, McQuillan CL, Shevlin S, Alkali M, Donnelly P
Department of Cardiology, Ulster Hospital, Dundonald, Belfast

59. Routine Trans-Oesophageal Echocardiography Directed Cardioversion in Patients with Atrial Fibrillation Treated with Dabigatran—A Single Centre Experience
Kennedy MW, Waterhouse DF, Sheahan R, Gumbrielle T, Foley DF, McAdam BF
Dept of Cardiology, Beaumont Hospital, Dublin

60. A Pilot Study on Renal Sympathetic Denervation for Resistant Hypertension in the West of Ireland
Kalyar I, Gleeson J, Lappin D, Crowley J, Nash P, MacNeill B, Daly K, Sharif F
Cardiology Department, Galway University Hospitals, Galway

61. ABC for Life: A Programme of BLS Training to Primary School Children in Northern Ireland Since 2004
P Mc Grath, L Laverty, P Toner, M Connolly
'ABC for life' charity committee, Queen's University Belfast, NI

62. Initial Experience with Vernakalant for Rapid Conversion of New Onset Atrial Fibrillation
Abidin NZ, Waterhouse DF, Foley D, Sheahan RS, McAdam B
Dept of Cardiology, Beaumont Hospital, Dublin

63. The Current Use of Oral Anticoagulation in Atrial Fibrillation Patients
Morgan RB, Mahon C, Sugrue R, Lynch M, Blennerhassett L, Curtin E, McMahon G, Murphy RT, Mulvihill N, Foley B, Crean P, Daly CA
St. James's Hospital, Dublin

13.00 *Close of Meeting*

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Session 3: Imaging

1 The Yield of Stress Perfusion CMR in Diabetic Patients

Ó h-Icí D, Moynagh A, Hovasse T, Unterseeh T, Louvard Y, Morice MC, Garot J

Institut Cardiovasculaire Paris Sud, Hôpital Jacques Cartier, 6 avenue du Noyer Lambert, 91 300 Massy, France

Background: The benefit of screening asymptomatic diabetic patients for CAD remains unclear. Recent ADA consensus statement concluded that routine screening is not recommended, whereas ACCF/AHA guidelines suggest that stress myocardial perfusion imaging may be considered for advanced cardiovascular risk assessment. We wished to assess the yield of stress perfusion cardiac MRI (CMR) in a diabetic population.
Methods: All patients who underwent stress CMR at our institute ($n = 4589$) between November 2009 and September 2010 were identified through the use of the cardiology database. Exclusion criteria included history of documented myocardial infarction, prior percutaneous coronary intervention, and prior coronary artery bypass grafting. For patients who underwent multiple tests during this time period, only the first test was included. The study population consisted of 2,737 patients.
Results: Similar percentages of diabetic and nondiabetics had abnormal scans (34.8 vs. 30.8 %, $p = 0.05$). Diabetics were more likely to have inducible ischemia (14.4 vs. 11.2 %, $p = 0.02$), but both groups were equally likely to have evidence of infarction on delayed enhancement images (23.7 vs. 22.2 %).
Asymptomatic and symptomatic diabetic patients had similar percentages of ischemia (13.5 vs. 15.8 %, $p = 0.40$), and infarction (21.9 vs. 24.9 %, $p = 0.36$).

Symptomatic diabetic patients had more ischemia (15.8 vs. 11.1 %, $p = 0.03$), but similar rates of infarction (21.9 vs. 21.2 %, $p = 0.79$) than symptomatic nondiabetic patients.
Conclusion: Stress testing in asymptomatic diabetics identifies a high percentage of patients with ischemia and unknown myocardial infarction. Diabetic patients have higher rates of ischemia than nondiabetic patients. Whether knowledge of silent infarction should change management is as yet unknown.

2 Diagnosis of Left Ventricular Non Compaction by Cardiovascular Magnetic Resonance Imaging in a Group of Patients with Left Ventricular Systolic Dysfunction

Noad RL, McKeag NA, Johnston N, Horan P, Harbinson M, Dixon LJ

Belfast Heart Centre, Northern Ireland

Introduction: Left ventricular non compaction (LVNC) cardiomyopathy is characterised by excessive trabeculations which communicate with the left ventricular cavity. Novel imaging modalities such as cardiovascular magnetic resonance (CMR) have increased the frequency of diagnosis of this uncommon cardiomyopathy. Degrees of LVNC have been noted in normal subjects, and in association with other cardiomyopathies. A ratio of end diastolic (ED) Trabeculated and ED Compacted left ventricular myocardium (TC) of greater than 2.3 is currently an echocardiographic diagnostic criterion for LVNC cardiomyopathy.
Aim: The aim of this study was to measure the degree of LVNC in a group of patients with left ventricular systolic dysfunction (LVSD).
Methods: We measured the EDTC ratio in 150 patients with an ejection fraction of less than 50 % undergoing CMR imaging in our centre over a 1 year period. Measurements were taken from the standardised 16 segment model. The TC ratio was calculated for each segment.
Results: The cause of LVSD was ischaemic heart disease (IHD) in 49.3 % of patients, dilated cardiomyopathy (DCM) in 13.3 % of patients, various causes in 37.4 %. No patient had a previously established diagnosis of LVNC cardiomyopathy. Mean LVEF was 34.1 %. Mean age was 62.2 years and 74 % were male. 39 % of patients had a TC ratio greater than 2.3 in at least one segment. Furthermore, 14 % had a TC ratio greater than 2.3 in more than one segment. The most commonly affected segments were apical anterior and apical lateral. Patients with DCM were the most likely to have one or more affected segments (45 %), with IHD the second most common aetiology (39 %) ($p = 0.063$).
Conclusion: A significant proportion of patients with impaired LVSD had evidence of LVNC in more than one segment when analysed utilising current echocardiographic diagnostic criteria. Further studies are urgently required to clarify and reappraise diagnostic features of this previously uncommon condition using CMR imaging to determine if LVNC has been overdiagnosed by CMR or previously underdiagnosed as a cause of LVSD.

3 Giant Cell Myocarditis in the CMR Era

Leong T

Harefield Hospital, Royal Brompton & Harefield NHS Foundation Trust, London

Background: Giant cell myocarditis (GCM) is rare with paucity of data. We sought to review cases of histologically-proven GCM to examine in particular, the potential role of cardiac magnetic resonance (CMR) imaging in the diagnosis and treatment.
Results: Of 16 patients with histologically-proven GCM who presented to our institution, a national transplant centre, five had CMR performed with two having repeat CMR. Of these, 4 were in cardiogenic shock at the time of biopsy (patients 1, 2, 4, 5). Their times from presentation at our institution to time of endomyocardial biopsy (and initiation of treatment) were 0, 3, 11, 0 and 8 days, respectively, while their times from presentation to first CMR were 12, 31, 9, 56 and 545 days, respectively. Table 1 summarises their CMR findings of moderate to severe reduction in left ventricular (LV) systolic function largely due to increase in end-systolic volumes (ESV) and their patterns of late gadolinium enhancement (LGE). All patients received steroids as well as immunosuppression: azathioprine/cyclosporin (Patient 3), and rATG (Patients 1, 2, 4, 5). Patient 4 had worsening of her LV from echo surveillance, leading to re-biopsy and follow-up CMR. Her re-biopsy did not show active GCM, and her follow-up CMR did not show any change in LGE, raising the possibility of deterioration in LV EF from adverse remodeling, and therefore, did not have repeat immuno-suppressive therapy. Figure 1

shows (a) widespread mid-wall LV LGE, (b) lateral wall fibrosis on the explant (H&E ×20) (c) GCM on biopsy (H&E ×200) of Patient 4 who had CMR and who subsequently underwent cardiac transplantation.

Conclusions: In this largest known CMR series of histologically-proven GCM, LGE on CMR imaging tends to be widespread involving all layers of the myocardium as opposed to the typical patterns of 'classical' myocarditis. This was representative of extensive inflammation and fibrosis which may reflect the high mortality associated with GCM.

Table 1 Summary of CMR findings

CMR quantification (median, IQR)	
LV EDV (ml)	158 (133, 175)
LV ESV (ml)	98 (75, 108)
LV EF (%)	39 (39, 53)
RV EDV (ml)	140 (123, 145)
RV ESV (ml)	63 (61, 75)
RV EF (%)	53 (49, 58)
LGE patterns	Patient 1—Mid-wall LGE: septum and inferior wall. No oedema
	Patient 2—Transmural LGE: inferior wall at papillary muscle level with oedema
	Patient 3—Widespread sub-endocardial and mid-wall LGE. RV involvement
	Patient 4—Subendocardial LGE: basal and inferior septum, mid and apical inferior, inferolateral and part of apical anterior wall. Mid-wall and epicardial LGE: mid-anterior septum and anterior walls. RV involvement
	Patient 5—Near global sub-endocardial LGE. RV involvement
Interval changes	
Patient 3	
LV EDV change	+5 ml
LV ESV change	+15 ml
LV EF change	−22 %
RV EDV change	+13 ml
RV ESV change	+24 ml
RV EF change	−10 %
Patient 4	
LV EDV change	+43 ml
LV ESV change	+56 ml
LV EF change	−35 %
RV EDV change	+53 ml
RV ESV change	+19 ml
RV EF change	+2 %

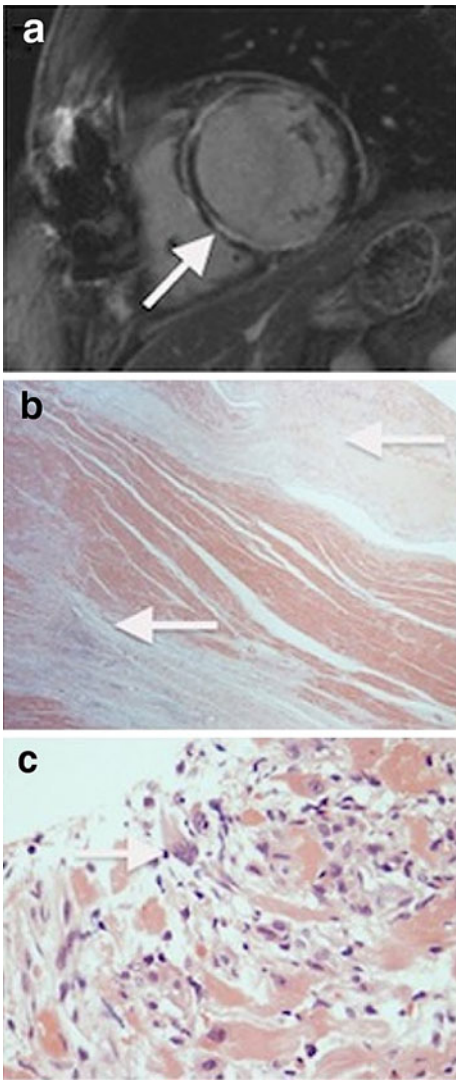

Fig. 1 GCM Correlation. **a** CMR: mid-wall late gadolinium enhancement in the LV, **b** Explant morphology: lateral wall fibrosis (H&E, x20) and **c** Histology: endomyocardial biopsy (H&E, x200)

4 A Method of Studying the Course of Myocardial Ischemia and Reperfusion in Rats In Vivo

[1]Ó h-Icí D, [2]Thore D, [1]Titus K, [1]Messroghli D

[1]Department of Congenital Heart Disease and Pediatric Cardiology, Deutsches Herzzentrum Berlin, Augustenburger Platz, Berlin 13353, Germany; [2]Department of Cardiology, German Heart Center Berlin, Berlin, Germany

Background: The use of MRI for the study of ischemia and its consequences in small animals has been limited by the need for a thoracotomy and operative occlusion of the coronary arteries. The trauma of the surgery may be an important confounder in this open-chest model. The closure of the coronaries with a suture does not allow multiple occlusion-reperfusion cycles, and has limited the study of ischemia–reperfusion in small animals.
Objective: To develop a "closed chest" model of ischemia–reperfusion, which would allow ischemia and infarction to be studied in real-time while the rat is in the MRI environment.
Materials and methods: We developed a method of implanting a balloon occluder to the left coronary artery. Male Sprague–Dawley rats ($n = 12$, weight 367 ± 67 g) were anaesthetized and then intubated. The heart was exposed by an incision in the fourth rib space. The occluder was then secured loosely to the myocardium with a 6-0 non-absorbable suture. Occlusion and reperfusion of the coronary artery was confirmed by visual inspection (blanching of the left ventricle) and by ECG (ST-segment elevation and normalization) on brief inflation and deflation of the balloon. The tubing of the occluder was then tunneled to the intra scapular area. The tubing was then looped in a subcutaneous pocket and the incision at the back was closed. The animals were then allowed to recover from the operation for at least 5 days. For coronary occlusion and MRI scanning, rats were again anaesthetized, the tubing was exposed by reopening the incision on the back, it was then connected to a syringe, and animals were placed in the MRI scanner.
Results: There was a very low mortality rate for the implantation of the coronary occluder (8.3 %). Inflation of the occluder on the MRI table resulted in myocardial ischemia in all animals as documented by ECG, and allowed the effects of ischemia and reperfusion on myocardial edema and function to be studied serially before, during, and after coronary occlusion. The changes in ECG were visible on the standard Philips console. There was no visible artifact from the occluder on any of the images.
Conclusions: The use of a pre-implanted balloon occluder allows for studying of the effects of single or repeated myocardial ischemia and reperfusion with MRI in real-time in a closed-chest rat model. As the current treatment of myocardial infarction is urgent revascularization, this model is more clinically relevant than a simple infarction model. A more physiologically suitable model should aid the study of the complex mechanisms involved.

5 Cigarette Smoking: Relationship with Inflammation, Arterial Stiffness, and Subclinical Atherosclerosis. The Multi-Ethnic Study of Atherosclerosis (MESA)

McEvoy JW, Blaha MJ, Lima JAC, Bluemke DA, Hundley WG, Min JK, Shaw LJ, Lloyd-Jones DM, Barr RG, Budoff MJ, Blumenthal RS, Nasir K

John Hopkins Hospital, Baltimore, MD, USA

Background: Smoking is a major reversible cardiovascular risk factor. Large population studies, incorporating measures of inflammation and subclinical atherosclerosis, may provide a means to study the effects of smoking further.
Methods: MESA is a population-based study of 6815 adults, free of baseline cardiovascular disease, recruited from 6 US sites. We stratified participants based on smoking status into 3 groups: never (NS), former (FS), and current (CS). FS and CS were further stratified into quartiles of pack-year history of tobacco exposure (PYH). We assessed cross-sectional associations of smoking with markers of inflammation [C-reactive protein (CRP), fibrinogen, and interleukin L-6 (IL-6)], arterial stiffness (aortic distensibility by magnetic resonance imaging), and subclinical atherosclerosis (SCA) [carotid intima-media thickness (cIMT), and coronary artery calcification (CAC)] by robust linear regression as well as prevalence ratio regression using a generalized linear model and binomial error distribution, after adjustment for covariates. We excluded 23 participants without information on smoking status from the final analysis.
Results: CS comprised 887 (13 %, mean age 58 years), FS 2487 (37 %, 63 years) and NS 3418 (50 %, 62 years) participants. CS were more likely to be younger, male, Caucasian or African American, and have lower LDL-C. The 3 inflammatory markers studied were all elevated in CS. Compared to NS, the adjusted odds ratios for prevalence of CRP ≥ 2 were 1.2 ($p < 0.001$) for former and 1.9 ($p < 0.001$) for CS, respectively. Amongst FS and CS, increased inflammation was noted in the highest quartile of PYH. Aortic distensibility was reduced in CS only, and no association was seen with PYH. However, cIMT and CAC were elevated in both FS and CS, with a greater burden of disease in the highest quartile of PYH.
Conclusion: These findings suggest a dose–response association between smoking and markers of inflammation as well as measures of SCA. Only current smoking was associated with reduced aortic distensibility.

6 Cardiac CT for the Assessment of Pain and Plaque: the 90 day Results of a Randomised Control Trial

McKavanagh P, Lusk L, Ball P, Trinick T, Duly, Walls G, Harbinson M, McQuillan CL, Shevlin S, Alkali M, Donnelly P

Ulster Hospital, Dundonald, Belfast

Objective: To determine the accuracy and cost impact of the diamond forrester (DF) and calcium score (CS) pathways proposed by NICE clinical guideline 95 (CG95).
Method: This was a sub-study of the cardiac CT for the assessment of chest pain and plaque (CAPP) study, a larger randomised control trial (ISRCTN52480460), evaluating the cost-effectiveness of cardiac CT in stable patients. The CAPP study recruited 500 participants referred to NHS Rapid Access Chest Pain Clinics with suspected coronary artery disease. This work involved the 250 patients randomised to the CT arm of the CAPP study. The total number and cost for initial and further investigations was determined theoretically by two models. Model A used the DF criteria and Model B the CS criteria.
Results: Of the 250 patients, 4 withdrew. 140 (57 %) patients were male. The mean DF was 47.8 and mean CS 172.5. Of the 52 patients that had a DF score of 0–9 % 1 (1.9 %) had severe disease and of the 91 that had a DF >60 % 17 (18.7 %) had no CAD. Of the 126 patients that had a CS of zero 2 (1.6 %) patients had severe disease and of the 26 patients with a CS >400 only 4 (15.4 %) did not have severe disease. A Kendall's tau-c (τc), rank correlation coefficient was performed with CS showing a better correlation (τc 0.768, SE 0.026) with CAD compared to the DF (τc 0.44, SE 0.047). In the costing analysis CS proved to be less expensive in all scenarios considered.
Conclusions: The use of CS to triage all patients appears to be more economical and accurate for the prediction of CAD and prevents unnecessary downstream testing.

7 Angiotensin-Converting Enzyme Inhibition and Non-Dipping Hypertensives—Targeting Night-Time Blood Pressure to Improve Ventricular Function

Voon V, Ledwidge M, O'Hanlon R, McDonald K

St. Vincent's University Hospital, Elm Park, Dublin

Purpose: Blood pressure (BP) optimization remains a central focus in strategies to prevent heart failure (HF). The non-dipper (ND), defined by failure of nocturnal BP to fall by 10 %, is an emerging risk factor profile for ventricular dysfunction in patients with hypertension. ND has been shown to persist independent of conventional anti-hypertensive strategies targeting daytime figures. As effective strategies modulating this risk profile are yet to be proven, we aim to investigate the impact of night-time administered angiotensin-converting enzyme inhibition on clinical, biochemical and Doppler-echocardiographic parameters on ND.
Methods: This prospective study randomized 45 ND with asymptomatic hypertension and optimally treated daytime BP to additional night-time administered perindopril (2.5–5 mg/night) (intervention) or conventional daytime anti-hypertensives (controls) over 3 months. Patients were assessed with B-type natriuretic peptide (BNP), 24-h ambulatory BP monitoring and Doppler-echocardiography at baseline and follow-up.
Results: Baseline demographics for all patients were assessed [65.2 ± 9.4 years, male 58 %, diabetes 47 %, body mass index >30 kg/m^2, average daytime systolic BP (SBP) 127 ± 8, diastolic BP (DBP) 72 ± 7 mmHg, follow-up duration 3.3 ± 0.8 months, BNP 47.5 ± 59.6 pg/mL, creatinine 72 ± 20 mmol/L, LVEF 68 ± 7 %]. At baseline, there were no significant differences in cardiovascular phenotype between both groups. At follow-up, the intervention group showed higher transmitral flow velocities versus controls (1.0 ± 0.3 vs. 0.8 ± 0.2, $p < 0.05$). The intervention group also showed significant within-group reductions of nighttime BP and 24-h SBP (all $p < 0.05$). BNP levels and ND profiles persisted in both groups.
Conclusion: This study demonstrates that additional nocturnal administered perindopril reduces BP over a 24-h period and improves diastolic function (E/A) in ND with treated hypertension. Despite that, the persistence of ND profile and elevated BNP suggest an underlying active fibro-inflammatory pathology not resolved by current short-term therapeutic strategy. More work is needed to understand the pathophysiology of ND in the effort to prevent heart failure.

8 Wavelet Analysis of Blood Flow Velocity Waveforms Detects Differences in the Retro-Bulbar Circulation Between Heart Failure Patients and Controls

[1]Lyons KS, [2]McCann A, [1]McVeigh GE, [1]Harbinson MT

[1]Centre for Vision and Vascular Science, Queens University Belfast; [2]Medical Physics Agency, Belfast Health and Social Care Trust

Introduction: Heart failure (HF) is a clinical syndrome in which neurohormonal activation and cardiac remodelling occur in response to a pathological event. Microvascular dysfunction has been demonstrated in the setting of HF, however, the effect of HF on the retro-bulbar circulation is unknown. Our department has developed a novel method for analysing blood flow velocity waveforms obtained from vascular sites of interest which has been shown to detect differences in waveform morphology between healthy controls and patients with a variety of conditions associated with endothelial dysfunction.
Methods: As part of a study assessing biochemical and functional measures of endothelial function in HF, blood flow velocity waveforms from the ophthalmic and central retinal arteries were obtained from 32 patients with HF (mean age 64 years, 78 % male, 50 % ischaemic) and 10 age and sex-matched controls. HF patients were on maximum tolerated medical therapy with no hospital admissions for exacerbations in the previous 6 months. Waveforms were analysed using a discrete wavelet transform which decomposes each signal into constituent sinusoidal waveforms. Traditional measures used in waveform analysis [resistive index (RI) and pulsatility index (PI)] were determined, as well as mean amplitude of 9 contributory frequency bands determined by wavelet analysis. RI, PI and mean amplitude for each frequency band were compared using non-parametric statistics.
Results: Mean amplitude of frequency bands 5 and 8 were significantly higher in patients compared to controls for both ophthalmic ($p = 0.048$ and $p = 0.002$) and central retinal artery ($p = 0.028$ and $p = 0.028$) waveforms. In contrast, RI and PI were not different between groups.
Conclusion: Wavelet analysis of blood flow velocity waveforms provides a novel method for detecting microvascular dysfunction in HF and is more sensitive than traditional measures of waveform analysis such as RI and PI. Abnormalities of microvascular function in HF are widespread.

9 High Sensitivity Troponin T is Detectable in Most Patients with Clinically Stable Heart Failure

[1]Lyons KS, [2]McKeeman G, [1]McVeigh G, [1]Harbinson MT

[1]Centre for Vision and Vascular Science; [2]QUB, Belfast Link Labs, Belfast HSC Trust

Introduction: Troponin levels are used in the diagnosis of acute coronary syndromes (ACS), however, levels may be elevated in many other conditions which may coexist in patients at risk of ACS. A significant proportion of patients with stable heart failure (HF) have detectable levels of troponin using standard third and fourth generation assays, however, the incidence of detectable levels of high sensitivity troponin T (hs TnT) in HF patients is not well studied [1].
Methods: As part of a trial assessing vascular function in patients with systolic HF, 32 subjects had hsTnT levels measured at baseline. Patients had clinically stable HF, on maximal tolerated therapy with no recent admissions for exacerbations. HsTnT was measured on a multichannel analyser (Roche E Module).
Results: At baseline 27 (84.4 %) patients had detectable levels of hsTnT [median 13.8 ng/L (9.2–21.4)]. 14 (43.8 %) patients had levels above the 99th percentile of the normal range. When comparison was made between patients with ischaemic and non-ischaemic HF, 12 (75 %) patients in the non-ischaemic group and 15 (94 %) in the ischaemic group had detectable levels of hsTnT [median 13.93 ng/L (11.8–20.2) versus 13.71 ng/L (4.6–26.3); $p = 0.80$].
Conclusions: The majority of patients with stable HF will have detectable levels of hsTnT using new high sensitivity assays, and a significant proportion of these will be above the cut-off point used for diagnosis of ACS. If these patients present to hospital, modest elevations in hsTnT do not necessarily indicate recent ACS, and serial measurements should not be undertaken if not clinically indicated.

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10 Potentially Inappropriate Medicines in Heart Failure

Bermingham M, McDonald K, Ledwidge M

Heart Failure Unit, St. Vincent's University Hospital, Dublin and School of Medicine and Medical Science, University College Dublin, Dublin

Introduction: Heart failure (HF) patients frequently have multiple co-morbidities requiring pharmacotherapy. However, a number of frequently prescribed medicines are contraindicated or cautioned for use in HF. This study sought to establish the extent of prescribing of potentially inappropriate medicines (PIM) in HF and the costs associated with PIMs in a stable, outpatient HF population.
Methods: A guideline and literature review was performed and 19 PIMs were identified. The Delphi consensus method was used to assess these medicines. Specialists scored each medicine on a Likert scale to establish the likelihood of it causing harm in a HF patient. The medication record of patients attending for annual review at the St Vincent's University Hospital Heart Failure Unit was reviewed by a pharmacist with reference to the PIM list. Total number of PIM and total cost price (Euro) was calculated. All analyses were carried out in SPSS v18.
Results: Medication records of 350 consecutive patients were reviewed of whom 228 (65.1 %) were male. The mean age of the population was 72.7 $\pm$ 11.6 years. A total of 380 PIM were identified in 264 patients (75.4 %). This accounted for 15.1 % of all medicines prescribed. The most frequently occurring PIM was low dose aspirin (n = 197, 56.3 %), followed by inhaled beta2-agonists (n = 62, 17.7 %) and dihydropyridine calcium channel antagonists in HF patients with ischaemic heart disease (IHD) (n = 25, 7.1 %). Patients prescribed $\geq$1 PIM were more likely to have IHD, chronic obstructive pulmonary disease and diabetes and less likely to have atrial fibrillation than those with no PIM. Total cost of prescribed PIMs was €3907.45 per month.
Conclusion: HF patients remain at risk of being prescribed a PIM despite being cared for in a HF disease management programme. More data is required to clarify potential benefits associated with pharmacist HF medicines review.

11 Surgical Repair of Ischaemic Ventricular Septal Defects Within 9 Days of a Myocardial Infarct did not Lead to Any Survivors in a 13 Year Series of 26 Patients

Beattie G, Martel G, MacGowan S, Graham A

Royal Victoria Hospital Belfast, Belfast

Objective: Ischaemic ventricular septal defects (VSDS) occur in 1–2 % of all myocardial infarctions and account for 5 % of deaths following a myocardial infarction. The incidence is declining but it still presents a significant challenge to the cardiology and cardiac surgical team when they occur. Debate still remains in the literature which is driven by large North American centres about when is the correct time to operate on these patients. The objective was to assess if the outcomes in our unit was dependent on the timing of the operation compared to the original time of infarction.
Methods: 49 patients were identified with an ischaemic VSD. 26 patients had surgery and of the 26 patients 21 had a medical record available which permitted an accurate identification of the time of myocardial infarct. The surgical details were compiled from the national cardiac surgery database.
Results: The mean age of patients was 69. 57 % had an inferior VSD. Mean pre operative CVP was 12.9, PA diastolic 18.7. 58 % of cases were repaired using the Toronto exclusion technique. 66 % had simultaneous grafts. Post operatively 58 % of patients had a residual VSD. In hospital mortality was 48 %, however, 5 year survival excluding in hospital deaths was 50 %. No patient operated on within 9 days of a myocardial infarction survived and no patient with a Euroscore above 80 was discharged from hospital. The overall survival at 5 years was 30 %. Patients with a residual VSD post operatively did poorly and was the only factor to reach significance as a predictor of mortality.
Conclusions: This series of data would indicate that although a very small sample size there is no evidence that early surgery in our unit is associated with improved survival. The overall survival at 30 % is in keeping with the UK average.

12 Coronary Computed Tomography in Acute Chest Pain in the Emergency Department: Appropriate Patient Selection Informed by Multicenter Randomized Control Trials

Groarke J

Brigham and Women's Hospital, Boston, MA, USA

Background: Coronary computed tomographic angiography (CCTA) is considered an appropriate tool for investigating patients presenting with chest pain (CP), normal/equivocal ECG and cardiac biomarkers, no known coronary artery disease (CAD) who have a low to intermediate pre-test probability of CAD. Such patients account for up to 70 % of all CP presentations to Emergency Departments (EDs). In this context, CCTA has been shown to have excellent sensitivity and negative predictive value. The likelihood of cardiovascular events in the early years following a CT demonstrating normal or non-obstructive (<50 %) stenosis is very low. A review of the multicenter trials examining the role of CCTA in the ED is necessary to guide appropriate patient selection for CCTA and to direct national ED CCTA service planning and provision.
Methods: A complete review of all multicenter randomized controlled trials (RCTs) where CCTA was compared with standard of care (SOC) or nuclear myocardial perfusion imaging (MPI) was performed.
Results: Three relevant multicenter RCTs have been reported, all since September 2011: CT-STAT, ACRIN-PA and ROMICAT II trials. All trials included low to intermediate risk ED patients presenting with CP. CT-STAT trial compared CCTA versus nuclear MPI, whereas the other trials compared CCTA versus SOC. In total, 1,770 patients were randomized to the CCTA arm and 1,299 patients to control arms of these trials. All trials demonstrated that a CT based strategy for evaluating such patients safely reduced time to diagnosis and reduced length of hospital stay. Two trials demonstrated a significant increase in direct discharges from ED among CCTA cohorts, without an increase in missed acute coronary syndrome (ACS). The two trials that analyzed total ED costs demonstrated reduced costs associated with CCTA strategy. All trails analyzed downstream invasive coronary angiography (ICA); only one of three trials demonstrated a significant increase downstream ICA (12 % post-CCTA and 8 % post-SOC; p = 0.04).
Conclusions: Clinical trial evidence is accumulating to support use of CCTA in evaluating select patients presenting with acute CP to EDs. A review of the multicenter trials to date suggest that patients presenting with CP to ED, who satisfy the following criteria, may be appropriately evaluated with CCTA: age 40–74 years, normal/equivocal ECG and initial cardiac biomarkers, low to intermediate pre-test probability of CAD, no known CAD, no significant renal

dysfunction, where clinical suspicion of ACS is high enough to warrant further testing.

13 Variation in Measures of Right Ventricular Structure and Function Performed in Standard Versus Modified Apical Views

Groarke J, Rivero J, Cheng S

Brigham and Women's Hospital/Harvard Medical School, Boston, MA, USA

Background: Variation in morphology and function of the right ventricle (RV) has been associated with adverse outcomes in asymptomatic as well as symptomatic individuals. Thus, the ability to accurately measure such variation is critically important. Guidelines now recommend that echocardiographic assessments of the RV should include measurements performed in an apical view that maximizes the diameter of the chamber. However, the extent to which RV measurements made in this modified view differ from those made in a standard apical view is uncertain.
Methods: In a random sample of 43 patients (mean age 57 ± 17 years, 53 % women) who underwent clinical echocardiography, we compared measurements of RV structure and function performed in the standard apical 4-chamber view versus the modified "RV-focused view."
Results: Of the patients studied, 9 % had an LVEF <50 and 51 % had a PASP >40 mmHg. Measures of RV structure were larger in the modified than in the standard views for short-axis dimensions (4.1 ± 0.6 vs. 3.7 ± 0.7 cm for RVD1, and 3.2 ± 0.5 vs. 2.8 ± 0.6 cm for RVD2; $P < 0.003$ for both), but similar for long-axis dimension (6.8 ± 0.9 vs. 7.0 ± 0.9 cm for RVD3; $P = 0.50$). All dimensions were only moderately correlated between the modified and standard views ($r = 0.43$–0.50; $P < 0.01$). With respect to measures of RV function in modified versus standard views, TAPSE was higher, S' was similar, and FAC was lower.
However, functional measures were all strongly correlated between views, and these correlations remained strong irrespective of age, sex, BMI, LVEF, and PASP. In addition, patients identified as having abnormal RV function were largely similar with respect to measurements made in the modified compared to standard views.
Conclusion: When performed in a modified RV-focused view, compared to the standard apical 4-chamber view, measures of RV structure are only moderately correlated; on the other hand, measures of RV function are strongly correlated, particularly S'. Therefore, in the absence of readily available RV-focused images, measurements of RV function performed in the standard apical four-chamber view are likely to still be quite informative.

14 Cardiovascular MRI Findings in An Asymptomatic Male HIV Patient Population

Morgan RB, Loy A, O'Dea S, Takacs A, Mulcahy F, Meaney J, Daly CA

St. James's Hospital, Dublin

Aims: To study an asymptomatic group of HIV positive men on antiretroviral therapy (ART) and compare them to age and sex matched controls in order to detect underlying cardiovascular disease.

Methods: Prospective cohort study of asymptomatic HIV positive men on ART compared to male controls. Baseline demographics, 12 lead ECG, routine biochemistry, NT-proBNP, fasting lipids and glucose were recorded. Images were acquired on a 3T Achieva Philips scanner with 5 channel phase array cardiac coil and weight based IV gadolinium was given at 0.15 mmol/kg dose with post contrast inversion recovery imaging after 10 min. Controls were age and sex matched. Philips Viewforum software was used for post processing. Diastolic function was assessed using phase contrast analysis of mitral inflow to calculate E:A ratio.
CMR findings: Late gadolinium enhancement (LGE) of the myocardium was found in 5 cases and no controls. In 3/5 cases this was in a classical infarction pattern with subendocardial involvement. Others were consistent with prior myocarditis. There was no significant difference in mean LVEF (66.93 vs. 65.18 %), LVMI(60.05 vs. 55.94 g/m^2) or posterolateral wall thickness(8.28 and 8.16 mm) between cases and controls, respectively. Diastolic dysfunction determined by E:A ratio <1 was present in 18 % of patients and 7 % of controls. No patients or controls had Stage III or IV diastolic dysfunction. There were significant differences in E/A ratio between cases and controls ($p = 0.037$). Increasing age, hypertension and serum triglyceride were predictors for diastolic dysfunction (i.e E/A ratio <1.0) ($p = 0.001$, 0.022 and 0.039, respectively).
Conclusion: In our HIV patient population we found an increased incidence of LGE and diastolic dysfunction compared to age matched controls ($p = 0.03$).

Baseline demographics and risk factors

Finding	Cases (n = 86)	Controls (n = 26)
Mean age (years)	47 ± 9	42 ± 7.8
Current smokers (%)	42	19.2
Hypertension (%)	17	7
Diabetic (%)	6	4
TRIG >2 (%)	27	0
Cocaine use (ever %)	40	7.7
Fam Hx PCAD (%)	25	26.9

TRIG triglyceride level, *PCAD* premature coronary artery disease

15 Reduced Right Ventricular Myocardial Strain in the Elite Athlete is not a Consequence of Myocardial Damage

[1]*King GJ,* [2]*Murphy R,* [2]*Almuntaser I,* [1]*Mc Loughlin B,* [1]*Livingston A,* [1]*Nevin S,* [1]*Clarke JC*

[1]Eagle Lodge Medical Centre, O'Connell Avenue, Limerick; [2]St James Hospital Cardiology Department, Dublin

Background: Latest research shows that the lower resting values of right ventricular %strain may represent a physiologic changes rather than subclinical myocardial damage [1]. Therefore the aim of this study is to test this hypothesis.
Methods: Seventeen controls (mean age 27 ± 4), 24 footballers (mean age 24 ± 4) and 18 elite athletes (mean age 22 ± 4) were studied. RV% strain were measured using 2D speckle based automated functional imaging software. RV free wall isovolumic acceleration (IVA) was measured using pulsed wave tissue Doppler at

the lateral tricuspid annulus. Standard 2D echo were used to measured RV parameters including the index Tei (systolic and diastolic function) and the total annular plane systolic excursion (TAPSE) of the RV annulus NT-proBNP was measured by an electrochemiluminescence assay.
Results: The RV diameter was increased in the footballers and elite athletes compared to controls ($p < 0.001$). RV wall size was greater in the elite athletes compared to controls and footballers ($P = 0.002$). The peak IVA of the RV was higher in the elite athletes, compared to the footballers and to controls ($p < 0.001$). The mean RV% strain were lower in the elite athletes and the footballers compared to controls ($p < 0.001$). There was no difference in RV Tei index TAPSE and NT-proBNP across all subjects.
Conclusions: This reaffirms the hypothesis that the reduction in RV% strain is a physiological response which is counterbalanced by an increase in acceleration during the isovolumic phase.
Exercise strain rate imaging demonstrates normal right ventricular contractile reserve and clarifies ambiguous resting measures in endurance athletes [1].
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16 The Use of a Novel Iterative Reconstruction Algorithm CT to Assess Stable Chest Pain with: Results from the CAPIR Study

McKavanagh P, Lusk L, Ball P, Trinick T, Duly E, Walls G, Harbinson M, McQuillan CL, Shevlin S, Alkali M, Donnelly P

Department of Cardiology, Ulster Hospital, Dundonald, Belfast

Aims: The CAPIR study was designed to evaluate the impact of a novel iterative reconstruction (IR) algorithm on cardiac computed tomography (CT) image quality and effective radiation dose (ED).
Methods: CAPIR enrolled 250 consecutive patients with suspected coronary artery disease as a sub-study of the larger CAPP trial, which was designed to evaluate the implementation of NICE clinical guideline 95. Cardiac CT examinations were performed on a 64 channel detector CT. Scan protocols were patient specific with ECG triggering and dose modulation at the clinician's discretion. Cardiac data sets were reconstructed with standard filtered back projection (FBP) or IR technique. Image noise was measured within predefined regions of interest (ROI), and image quality qualitatively assessed by two clinicians blinded to the reconstruction method using a 5-point Likert scale. Effective radiation dose (ED) of each CT was estimated by multiplying the dose-length product by a chest-specific conversion coefficient ($K = 0.014\ mSv \times mGy^{-1} \times cm^{-1}$).
Results: 4 patients withdrew. 246 patients (140 males) underwent cardiac CT. 124 consecutively received a routine scanning protocol, with images reconstructed with FBP (72 with retrospective and 52 with prospective gating). 122 received a reduced tube output (112 with retrospective and 10 with prospective gating) with IR reconstruction. The mean estimated EDs were 6.5 mSv (FBP) and 4.3 mSv (IR) (dose savings 34 %) for all patients ($p < 0.00001$) and 8.3 mSv (FBP) and 4.4 mSv (IR) (dose savings 47 %) for the retrospective cohort. There was no statistical difference in noise or mean attenuation in all three ROIs. The mean IR image quality score was 3.67 ± 1.04 compared to 3.29 ± 1.17 for FBP images ($p < 0.001$). There was also significant agreement between the readers with a mean Kappa coefficient of 0.83.
Conclusion: IR in cardiac CT offers substantial ED reduction without compromise in image quality. It is a welcome addition for clinicians in our attempts to achieve ALARA principles.

17 Impact of Coronary Computed Tomographic Angiography Results on Patient and Physician Behaviour in a Low-Risk Population

McEvoy JW, Blaha MJ, Nasir K, Yoon YE, Choi EK, Cho IS, Chun EJ, Choi SI, Rivera JJ, Blumenthal RS, Chang HJ

John Hopkins Hospital, Baltimore, MD, USA

Background: The impact of screening coronary computed tomographic angiography (CCTA) on physician and patient behavior is unclear.
Methods: We studied asymptomatic patients from a health-screening program. Our study population comprised 1000 patients who underwent CCTA as part of a prior study and a matched control group of 1000 patients who did not. We assessed medication use, secondary test referrals, revascularizations, and cardiovascular events at 90 days and 18 months.
Results: A total of 215 patients in the CCTA group had coronary atherosclerosis (CCTA positive). Medication use was increased in the CCTA-positive group compared with both the CCTA-negative (no atherosclerosis) and control groups at 90 days (statin use, 34 vs. 5 vs. 8 %, respectively; aspirin use, 40 vs. 5 vs. 8 %, respectively), and 18 months (statin use, 20 vs. 3 vs. 6 %, respectively; aspirin use, 26 vs. 3 vs. 6 %, respectively). After multivariable risk adjustment, the odds ratios for statin and aspirin use in the CCTA-positive group at 18 months were 3.3 [95 % confidence interval (CI) 1.3–8.3] and 4.2 (95 % CI 1.8–9.6), respectively. At 90 days, in the total CCTA group versus controls, there were more secondary tests [55 (5 %) vs. 22 (2 %); $P < 0.001$] and revascularizations [13 (1 %) vs. 1 (0.1 %); $P < 0.001$]. One cardiovascular event occurred in each group over 18 months.
Conclusions: An abnormal screening CCTA result was predictive of increased aspirin and statin use at 90 days and 18 months, although medication use lessened over time. Screening CCTA was associated with increased invasive testing, without any difference in events at 18 months. Screening CCTA should not be considered a justifiable test at this time.

Session 4: Heart Failure/Prevention

18 Community Management of Cardiovascular Risk in Stage A/B Heart Failure: 6 Month Follow Up of the Compare-HF Cohort

Horgan S, Tallon E, Dawkins I, Conlon C, Watson C, Baugh J, Whyte K, Miwa S, McDonald K, Ledwidge M

St Vincent's University Hospital, Dublin

Background: Current guidelines for heart failure (HF) describe Stage A/B HF, or pre-HF, as predominantly community dwelling warranting careful risk factor management. COMPARE-HF evaluates the

cardiovascular risk factor profile and risk score over 6 months in a community based population with established Stage A/B HF.
Methods: The Community Programme with Cardiovascular Risk Evaluation for prevention of HF (COMPARE-HF) population is a cohort of community patients with a confirmed diagnosis of at least one of hypertension, diabetes and obesity. We compared blood pressure (BP), cholesterol, glucose, body mass index (BMI) and lifestyle risk factors as well as total cardiovascular risk at baseline and follow-up.
Results: 4296 patients, average age 61 ± 12 years (48.6 % male) with Stage A/B HF were identified. 68.3, 39.5 and 8.7 % had hypertension, obesity and diabetes, respectively. 33.3 % were current or ex-smokers, 74.1 % were overweight, 59.8 % took no daily cardiovascular exercise and 72.9 % consumed alcohol regularly. Normal cholesterol was found in 43.6 % (population average 5.15 ± 1.15 mmol/L) and 29.7 % had sitting BP <140/90 mmHg (population average 139.6/82.0 ± 18.9/10.6 mmHg). Average BMI was 29.0 ± 5.5kg/m^2 and average plasma glucose was 5.75 ± 1.9 mmol/L. Median time to reassessment was 6.2 months (IQR 3.3–12.1). Smoking rates remained unchanged. Exercise rates and alcohol intake improved modestly. Significant reductions in BP (−1.5/−1.0 ± 15.7/9.8 mmHg systolic and diastolic, respectively), cholesterol (−0.29 ± 1.02 mmol/L) and glucose (−0.06 ± 1.67 mmol/L) were observed (all $p < 0.0001$). However, 74.1 % of the population remained overweight, 62.9 % had BP >140/90 mmHg and 45 % had elevated total cholesterol. Framingham risk score increased from 6.13 ± 5.77 % at baseline to 6.22 ± 5.88 % at follow up ($p = 0.002$).
Conclusion: Cardiovascular risk profile of Stage A/B HF remained high in this community based risk factor intervention programme. Programmes such as the on-going STOP-HF study which involve a shared care approach with specialist support may be needed to modify the course of Stage A/B HF in at-risk community populations.

19 The Hidden Truth: Stage B Heart Failure Among Diabetics and Overweight

Murtagh G, O'Connell J, Dawkins I, King T, Griffin J, Tallon E, O'Hanlon R, Patel A, Ledwidge M, Mc Donald KM

St Vincent's University Hospital, Dublin

Purpose: Diabetes mellitus (DM) is an independent predictor of heart failure (HF). The optimal approach to this problem involves identifying patients at risk early in the course of the condition. Previous studies have shown a high prevalence of diastolic dysfunction in diabetic subjects. We set out to study the wider burden of structural and functional problems that could lead to heart failure.
Methods and results: The STOP-HF cohort consists of subjects over 40 with at least one cardiovascular risk factor. Each had a brain natriuretic peptide level and doppler-echocardiography performed. Stage B heart failure was defined as structural heart disease [consisting of ejection fraction <50 %, left atrial volume index >34 ml/m^2 and/or left ventricular mass index >149 g/m^2 (M), >122 g/m^2 (F)] in the absence of symptoms of heart failure. Of 1025 total patients, 234 (22.8 %) were documented as having DM. Prevalence of stage B HF was 19.8 % in the total population, 23.5 % in those with DM and 18.8 % in the non-diabetic cohort ($p = 0.001$). Age distribution was similar across the two groups.
There were 303 patients (33 %) with a BMI >30 kg/m^2. Of this obese cohort, 82 (27 %) had DM. Prevalence of stage B in the obese was 32 % overall. Comparing diabetic obese vs non-diabetic obese, stage B HF was present in 44 % of the diabetic obese compared to 28 % in the non-diabetic obese ($p = 0.013$).
Conclusions: Though asymptomatic, a significant proportion of the diabetic population had stage B HF, particularly those with BMI >30 kg/m^2. At a time of limited resources, this identifies a cohort of patients requiring more intensive risk factor control to prevent progression to symptomatic heart failure.

20 Reduced Absolute Myocardial Blood Flow is Associated with Worse Diastolic Dysfunction

Groarke JD, Murthy VL, Naya M, Di Carli MF, Shah AM

Brigham and Women's Hospital, a teaching affiliate of Harvard Medical School, Boston

Background: Impaired absolute coronary flow in the absence of perfusion abnormality may reflect coronary microvascular disease and has been associated with worse prognosis. Whether reduced coronary flow in the absence of perfusion defects is associated with concomitant subclinical abnormalities in contractile function has not been defined.
Methods: In 122 patients with normal rest and stress perfusion and ejection fraction by clinically indicated positron emission tomography (PET), rest myocardial blood flow (MBF) was calculated with factor analysis and a two-compartment kinetic model. Quantitative analysis of matched echocardiograms (including strain rate assessment by myocardial deformational imaging) was performed for parameters of left ventricular (LV) systolic function: LV ejection fraction (EF), peak systolic mitral annular velocity (S′), and peak systolic strain rate (SSR). The correlation between MBF and diastolic parameters was performed using Pearson correlation.
Results: Mean LVEF was 59 ± 7 %. Rest MBF was not significantly related to LVEF ($p = 0.42$). However, lower MBF was significantly associated with lower S' (lateral annulus: Pearson correlation coefficient (r) 0.32, $p = 0.0007$; septal annulus: r 0.21, $p = 0.03$). Lower MBF was also significantly associated with worse mean peak longitudinal SSR (r −0.22, $p = 0.05$).
Conclusions: Lower rest MBF is significantly associated with echocardiographic markers of worse systolic longitudinal function despite largely preserved LVEF. Future studies should investigate whether coronary microvascular dysfunction is contributing to the etiology of subclinical abnormalities in LV contractile function.

21 Diabetic Hearts Show Increased Lysyl Oxidase Expression

Horgan S, Watson C, Collier P, Ledwidge M, McDonald K, Baugh J

The Conway Institute, University College Dublin, Dublin

Background: Lysyl oxidase (LOX) is a copper-dependent enzyme that plays a critical role in the biogenesis of connective tissue matrices. LOX-mediated cross-linking of collagen types I and III fibrils leads to the formation of stiff collagen and its subsequent tissue deposition. Evidence from experimental and clinical studies shows that an excess of LOX is associated with increased collagen cross-linking and stiffness resulting in cardiac fibrosis and left ventricular dysfunction. Pre-clinical non-cardiac studies also suggest that LOX expression is increased in hyperglycaemic states.
Aim: To determine whether LOX expression is increased in the myocardium of diabetic patients.

Methods: LOX immunohistochemical analysis was performed on atrial tissue acquired from 36 patients undergoing cardiothoracic surgery for ischaemic or valvular heart disease. Quantification of immunostaining was estimated using a digital image analysis system (Aperio). LOX staining in diabetic patients was compared with non-diabetics. LOX gene expression was also determined in both groups by quantitative real-time polymerase chain reaction (QPCR).
Results: Five diabetic patients were identified and compared with the remaining 31 patients in the cohort. Digital image analysis revealed increased staining intensity for LOX protein in the diabetic group compared to non-diabetic controls. A significant increase in strongly positive pixels ($p < 0.05$) and a significant decrease in weakly positive pixels ($p < 0.05$) was evident in the diabetic tissue. QPCR also showed that LOX gene expression is increased in the diabetic group.
Conclusion: Our findings demonstrate tissue evidence of increased gene and protein expression of the collagen cross-linking enzyme LOX in diabetic hearts. We propose that this enhanced LOX activity may contribute to the development of diabetic cardiomyopathy.

22 Identification of Serum Biomarkers that Reflect Progressive Cardiac Remodelling

Watson C, Collier P, Horgan S, Conlon C, O'Hanlon R, Ledwidge M, Baugh J, McDonald K

UCD Conway Institute of Biomolecular and Biomedical Research, Belfield, University College Dublin, Dublin

Heart failure with preserved ejection fraction (HFpEF) is commonly preceded by a prolonged asymptomatic phase during which progressive left ventricular diastolic dysfunction (LVDD) develops. HFpEF preventative strategies urgently require better biomarkers for identifying disease manifestations before the onset of symptoms, and irreversible fibrosis and myocardial damage. In addition, biomarkers that predict the likelihood and rate of disease progression over time would help streamline and focus clinical efforts.

To address this we have embarked on a biomarker screening study to try and identify a serum bio-signal that reflects ventricular dysfunction and heart failure. To date, we have identified a panel of possible disease-relevant candidates. The work reported herein is a subcomponent of a prospective study (STOP-HF trial; NCT00921960), where we are specifically looking at the prognostic utility of our serum biomarkers in a pre-HF population with risk factors for the disease.

To investigate the dynamics of our serum biomarker levels with progressive LVDD, we identified a cohort of 30 subjects from a population of 518 asymptomatic hypertensive patients from the STOP-HF trial, whom following serial clinical and echocardiographic assessment exhibited evidence of progressive left ventricular remodelling. Progression was based on changes in left atrial volume index (LAVI). Progressors were identified as those having a change in ΔLAVI above a calculated reference change value ($\geq$3.5 mls/m^2) from an initial LAVI between 20 and 34 mls/m^2. A matched non-progressor cohort was selected and were similarly identified as those having ΔLAVI <3.5 mls/m^2. ELISA based serum analysis revealed that relative changes in MMP9, TIMP1 and LRG, markers of interstitial remodelling and LVDD, tracked with changes in LAVI over time (all $p < 0.05$). This highlights a potential role for these serum biomarkers in the identification of accelerated changes in LAVI, and may be a potential aid in highlighting this at-risk group.

23 Assessing Psychological Well-Being in a Population Undergoing Screening for Inheritable Cardiac Diseases

McQuade C, McShane C, McGorrian C, O'Donnell C, O'Neill J, Keelan E, Galvin J, Mahon NG, Codd M

Family Heart Screening Clinic, Mater Misericordiae University Hospital, Dublin

Introduction: Screening for inherited cardiac diseases is recommended in first degree relatives of affected persons. However, this may be associated with a burden of anxiety in patients undergoing assessment. We aimed to assess the psychological well-being in such a screening population and to examine potential associates of increased psychological distress.
Methods: Prospective cohort study of family members ($n = 334$) with a family history of inheritable cardiac disease or a sudden arrhythmic death syndrome (SADS) bereavement. After providing informed consent, participants completed two self-reported questionnaires prior to their clinic visit: (1) the Short Form-12 (SF-12) Health Survey and (2) the Hospital Anxiety and Depression Scale (HADS) which provides information regarding patients' depression and generalised anxiety. Logistic regression models were used to examine for associates of a clinically significant HADS score (HADS $\geq$11).
Results: Of 420 eligible patients, 334 provided valid HADS data (response rate 86.6 %, valid response rate 79.5 %). The mean age was 36.2 years (SD 13.24), with 47.0 % of respondents being male. Patients attending for SADS screening accounted for 22.2 % of the population. Almost one in five patients (19.2 %) had a clinically significant level of anxiety or depression. Factors which confer a risk for a clinically significant HADS score were female sex, and being a first degree relative to the proband (vs. second degree or higher). Protective factors include being married (vs. separated or single), and having completed education to third level (vs. lower educational attainment) (Table 1). Indication for screening was not significantly associated with either of the measures of psychological well-being.
Conclusions: Significant anxiety and depression is present in one-fifth of patients attending for family heart screening. Clinicians should be aware of the higher levels of anxiety and depression in females and consider psychological support on a case by case basis.

Table 1 Simple logistic regression, with a significant HADS score as the outcome variable, with all models adjusted for age and sex

	Odds ratio	95 % confidence interval	P value
Age (in years)	0.99	0.97, 1.01	0.24
Male sex	0.48	0.27, 0.85	0.01
Degree level education vs lower	0.36	0.17, 0.77	<0.01
Marital status: Married vs single/ widowed / divorced	0.49	0.23, 1.03	0.06
Screening reason: SADS vs other reasons	0.90	0.46, 1.79	0.77
First degree relative to family index case	2.27	1.13, 4.56	0.02

Session 5 Structural Heart Disease

24 Long Term Prevention of Recurrent Cerebrovascular Events with Transcatheter Patent Foramen Ovale Closure- Findings in Contrast to the Closure I Trial

Margey R, Elmariah S, Renfigo-Moreno P, Inglessis I, Palacios IF

Structural Heart Disease, Interventional Cardiology and Structural Heart Disease, Division of Cardiology, Massachusetts General Hospital, Boston, USA

Background: The role of transcatheter closure of PFO for prevention of recurrent cerebrovascular events in patients with cryptogenic ischemic stroke has been questioned with publication of the controversial Closure-1 trial, a prematurely terminated underpowered study of an inferior closure device.
Aim: We aim to describe the long term outcomes of a single centre cohort of 805 patients undergoing PFO closure for prevention of recurrent stroke.
Results: A total of 805 PFO closures were performed. Mean age was 50 years with 52 % male gender. 29.7 % had prior hypertension, 24 % had prior hyperlipidemia, 10.9 % were current or former smokers, 10.1 % had a family history of vascular disease, 31.3 % had a hypercoagulable disorder and 12.1 % had chronic iliac vein compression. 87 % had evidence of right to left shunting, with 56 % having shunting both at rest and with valsalva manoeurve. 40 % had high risk echo features with either hypermobile septum or atrial septal aneursym.

Procedural success was 99 %. The most frequently used closure device was an amplatzer device (38 %), with overall effective defect closure (defined as complete or minimal residual shunt) in 96 %. At 30 days, 1 death (0.1 %), no stroke, and 1 TIA (0.1 %) occurred. 4 device embolizations occurred (0.5 %), and 18 (2.2 %) patients developed Afib. In long term follow-up, 8 deaths (1 %), 5 strokes (0.6 %), 9 TIAs (1.1 %), and 38 (4.7 %) redo PFO closures for residual shunting occurred, giving an overall MACE (death/TIA/CVA) rate of 2.8 %. Median follow-up was 18 months (range 1 day–15 years).
Conclusions: Transcatheter PFO closure for the prevention of recurrent stroke can be performed safely with excellent long-term outcomes, freedom from recurrent stroke or TIA occurring in 98.3 % of patients at a median follow-up similar to the Closure I trial. These robust outcomes, better than the Closure-I trial, support our strategy of independent patient evaluation prior to closure by a multi-disciplinary team of neurologists, hematologists, and interventional cardiologists.

25 Thrombus on Left Atrial Appendage Occluder Device: Periprocedural Caution

Waterhouse DF, Mehta AG, Abidin NZ, Kennedy MW, Alqaseer M, Asegom SD, Foley D, McAdam B

Beaumont Hospital, Beaumont, Dublin

Introduction: Atrial fibrillation (AF) is associated with up to 20 % of ischemic strokes, with the left atrial appendage (LAA) being the main source of thromboemboli. LAA closure has been shown to be an effective strategy for thromboprophylaxis. However, the need for periprocedural anticoagulation following LAA occlusion is often complicated by the significant anticoagulation risk in this chosen population. We therefore wished to determine the efficacy of low dose Dabigatran (110 mg BD) in preventing thrombus formation following LAA occlusion.
Methods: Thirty-five patients (27 men, 8 women; mean age 74.5 ± 8.2 years) with nonvalvular AF, at high risk for cardioembolic stroke (mean CHA_2DS_2VASc score 3.6 ± 1.8) and complications of oral anticoagulation, underwent percutaneous LAA closure using the WATCHMAN device. All procedures were performed with fluoroscopy and transoesophageal echocardiography (TOE) guidance. Follow-up included clinical and echocardiographic review within 45 days.
Results: The LAA was successfully occluded in 31 patients (97.1 %). In four cases, device insertion was abandoned due to unsuitable appendage anatomy. The mean device size was 24.6 ± 3.8 mm. All procedures were uncomplicated and had no residual flow. Post WATCHMAN insertion, due to anticoagulation contraindications, 15 patients were given low dose Dabigatran therapy (110 mg BD) rather than full dose. The 6-week follow up TOE demonstrated mobile thrombus on the atrial side of the device in four patients treated with low dose Dabigatran. These patients were subsequently commenced on full anticoagulation. Subsequent TOE demonstrated full resolution of the thrombus in all patients. No thrombus was demonstrated in patients who received Warfarin or full dose Dabigatran anticoagulation.
Conclusion: Our experience revealed that while LAA occlusion is a safe and successful procedure, the practice of low dose Dabigatran therapy, before endothelisation of the device, is insufficient in preventing device-related thrombus formation. We suggest that full anticoagulation should be undertaken for the first 3 months following implantation.

26 Catecholamine-Induced Heart Hypertrophy: Impact on Cardiac Function

[1]Lainis F, [2]Buckley MM, [2]Johns EJ

[1]School of Medicine, University College Cork, Cork;
[2]Department of Physiology, University College Cork, Cork

Background: The impact of experimentally induced heart hypertrophy on cardiac haemodynamic parameters and inotropic responses are not fully understood. We investigated the effects of isoprenaline and the NO synthase inhibitor N^G-nitro-L-arginine (L-Name) on two groups of Wistar male rats, control versus heart hypertrophy animals.
Methods: Heart hypertrophy was induced by a 2 week regime of isoprenaline and caffeine treatment. Nine control and seven heart hypertrophied male Wistar rats, 220–260 g were anaesthetized by the administration of 1 ml (ip) of a chloralose/urethane mixture (16.5 and 250 mg/ml, respectively) with supplemental doses of 0.05 ml every 30 min. Cannulae were inserted into the right femoral artery, to monitor blood pressure and heart rate, and into the right femoral vein for the infusion of sustaining saline (3 ml/h of NaCl, 9 g/l). Left ventricular haemodynamics were recorded using a micro-tip pressure tranducer catheter introduced into the left ventricle via the right carotid artery. The protocol consisted of bolus injections of a β-adrenoceptor agonist, isoprenaline 5 μg/ml before and after the infusion of L-NAME, a nitric oxide synthase blocker a rate of 10 μg/min/kg. The haemodynamic parameters in the control rats and heart hypertrophied rats were compared using one way repeated measures ANOVA.
Results: The 2 week isoprenaline/caffeine treatment markedly increased both heart weight and heart weight/body ratio. This was associated with an increase in maximum dP/dt and contractility index

of 17 % and 14 % ($P < 0.05$), respectively, in the isoprenaline/caffeine treated rats. The L-NAME was found to increase the inotropic effect of the β-adrenoceptor agonist isoprenaline but have no effect on basal myocyte contractility.
Conclusion: The results indicate that in this model of heart hypertrophy cardiac function was increased as reflected by the higher maximum dP/dt and contractility index. The increases in contractility index in response to isoprenaline seemed potentiated following blockade of nitric oxide synthase.

27 Cost Benefit Analysis of Transcatheter Aortic Valve Implantation (TAVI) Compared to Conventional Medical Treatment Including Valvuloplasties in Patients with Severe Aortic Stenosis (AS)

[1]Neoh S, [2]Mahon C, [3]Kiat C, [1]Galvin B, [2]Sugrue R, [3]O'Neill C, [1]Crowley J, [2]Foley B, [2]Crean P, [1]Sharif F

[1]University College Hospital Galway; [2]St. James's Hospital, Dublin; [3]AMNCH, Dublin

Objective: To evaluate the cost effectiveness of TAVI compared with conventional medical treatment in patients with severe AS who are ineligible for surgical AVR. In addition, we also assess Quality of Life (QOL) and mortality rate between the two groups.
Methods: The research was gathered between Galway University Hospital (GUH) and St James Hospital. Ethical approval was obtained from SJH/AMNCH Research Ethics Committee for this study. In GUH, retrospective chart review were conducted over 2 year period in patients who had severe AS, high risk for AVR treated with conventional medical treatment (Group 1—42 patients). In St James hospital we enrolled patients who had TAVI over 2 year period (Group 2—44 patients). For each patient, we identified the number of admission, Inpatients and outpatients days, number of Echo, valvuloplasty and TAVI. The Unit cost was estimated by Casemix. We had also ask to rate their health status and filled out EQ5DQOL questionnaire. The costing for this study was performed by employing health technology assessment.
Results: We enrolled 86 patients with severe AS of whom 42 patients were treated with conventional medical treatment in GUH and 44 patients were treated with TAVI in St James hospital over 2 year period (2009–2010). Mean age was 84 years old of whom 53.4 % were male and 46.5 % were female. As compared with patients receiving conventional treatment, patients in the TAVI group had an overall higher total cost, TAVI [(30140 $\pm$ 6711) vs. conventional (15265 $\pm$ 15252)], ($P = <0.001$), however, with lesser readmission rates TAVI (0.36 $\pm$ 1.01) vs. conventional treatment (2.29 $\pm$ 1.5), ($P = <0.001$) and lower mortality rate (TAVI 9.3 % vs. conventional treatment 30.9 %, $P = 0.010$ and 95 % CI 0.0519, 0.3811). In QOL study, the mean for those who had TAVI was 68.6 % (SD $\pm$ 16.2) whilst the mean for conventional treatment was 56.8 % (SD $\pm$ 19.0), $P = 0.015$ (95 % CI -21.2, -2.38). Those who had TAVI reported 11.8 %, on average, higher health percentage (QOL) compared with those who had conventional treatment.
Conclusion: In this study, the total cost of treatment with TAVI was significantly higher compared with conventional medical treatment for patient with AS high risk for AVR. However, patient treated with TAVI has lower readmission rate, significantly lower mortality rate and better quality of life.

28 Conventional Aortic Valve Replacement Surgery in Patients not Suitable for Trans-Catheter Aortic Valve-Outcome Assessment

Beattie R, Booth K, Spence M, Jones MJ

Royal Victoria Hospital, Belfast

Introduction: Patients who are high risk for conventional surgical aortic valve replacement (AVR) have been offered trans-catheter aortic valve replacement (TAVI) at our institution since 2008. These patients are discussed at a multi-disciplinary meeting and those who are refused on technical or clinical grounds for TAVI may be offered surgical AVR.
Methodology: Data prospectively collected between February 2008 and March 2012 for patients ($n = 30$) undergoing high-risk AVR were analysed. Hospital records and national death registry were searched retrospectively.
Results: 19 patients (63 %) had concomitant coronary artery bypass grafts, 3 (10 %) had mitral valve surgery, with the remainder solely AVR. Median age was 83 (range 53–90), mean ejection fraction 46 % with a mean logistic EuroSCORE of 21.1 %. 3 patients (10 %) had undergone previous cardiac surgery. Median cross-clamp time was 106 (range 65–233 min) and median bypass time was 143.5 (range 86–359 min). Major complications seen in the post-operative period included re-sternotomy for bleeding (4 patients), renal failure requiring dialysis (1 patient), sternal osteomyelitis (1 patient), permanent pacemaker insertion (1 patient), and redo AVR for prosthetic valve endocarditis (1 patient). The median length of hospital stay was 14 days (range 6–51) with no in-hospital mortality. One-year mortality was 9.5 %.
Conclusion: Conventional open surgery remains a valid option for high-risk patients in need of aortic valve replacement.

29 Current Demand for Surgery for Rheumatic Heart Disease in Northern Ireland

Umar Imran Hamid, Alastair Graham

Royal Victoria Hospital, Belfast

Introduction: Rheumatic valve disease is a chronic inflammatory, non-suppurative complication of pharyngitis that is caused by group A-hemolytic streptococci. The incidence of rheumatic fever has reduced significantly in the developed countries and the aim of this study was to evaluate the current need for surgery for rheumatic valvular disease and its association with geographical location in Northern Ireland.
Methods: Review of a prospectively maintained cardiac surgery database was performed. Four hundred and four patients were identified in the database that underwent valve surgery for rheumatic heart disease between 2001 and 2011. Demographic details, NYHA class, Euroscore, in-hospital mortality and nature of surgery were obtained and analysed.
Results: The mean age was 65 years (range 20–86). 297 were female, 107 were male. 331 mitral, 123 aortic and 11 tricuspid rheumatic valves were operated. The predominant haemodynamic lesion was stenotic in 44 %, mixed in 36 % and regurgitant in 20 % of the cases. 30 % of patients had previous valve surgery with mean interval to repeat surgery of 21.5 years (range 1–46 years). A mean of 36 patients operated each year have an underlying rheumatic valvular disease (Fig. 1). Distribution of patients operated from various trusts (Fig. 2). Mean Logistic Euroscore was 9.79. In hospital mortality was 4.7 %.
Conclusions: Despite reduction in the incidence of rheumatic fever to 1 per 100,000 of the population rheumatic valves operated each year in Northern Ireland remains unchanged in the last decade.

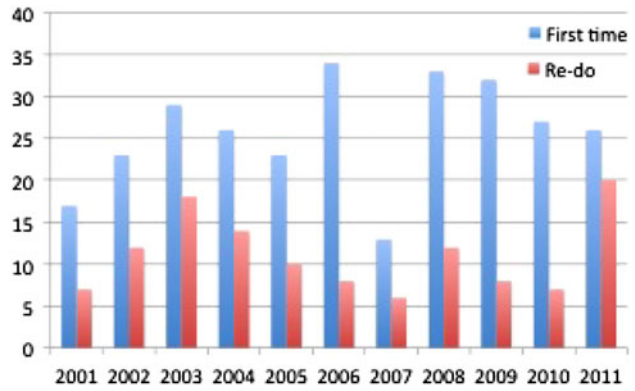

Fig. 1 Re-do vs first time valve surgery each year

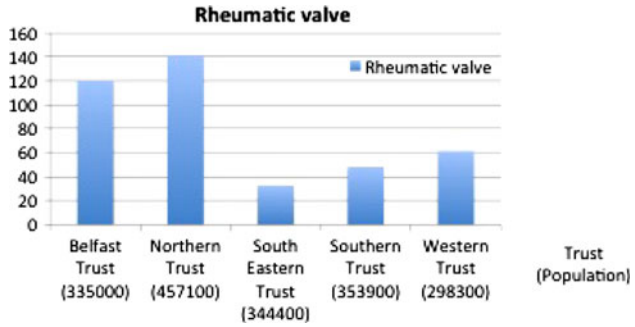

Fig. 2 Geographical distribution

30 Percutaneous Closure of Patent Foramen Ovale for Secondary Prevention of Paradoxical Embolus: Beating the Odds

Galvin M, James S, Waterhouse DF, Abidin NZ, Asgedom SD, McAdam B, Foley D

Department of Interventional Cardiology and Department of Interventional Echocardiography, Beaumont Hospital, Dublin

Background: Percutaneous closure of patent foramen ovale (PFO) is a commonly used method of secondary prevention for patients with PFO who have had a cryptogenic stroke. Recent data suggests that PFO closure with a percutaneous device may not offer greater benefit than medical therapy alone in preventing recurrent stroke or transient ischaemic attack (TIA). However, this trial reflected PFO closure in low volume centres, with sites recruiting an average of two patients per year. We therefore wished to determine whether this intervention reduces the risk of recurrent stroke in patients with large PFOs, performed in a large volume center.
Methods: All patients, referred exclusively from neurologist, who underwent percutaneous closure of PFO as secondary prevention following presentation with presumed paradoxical embolic event over a 5 year period (2006–2011) were included in the study. Main outcome measures were results of transoesophageal echocardiography (TOE) 6 months post-procedure, recurrence of stroke or TIA during the follow up period, and death from neurologic causes in the follow up period.
Results: One hundred and fifteen patients (64 male, 51 female; mean age 45 ± 15 years) were included. All procedures were performed under conscious sedation, with fluroscopic guidance alone. Various devices were used for closure with mean size 26 ± 4 mm. No significant procedural complications occurred. All patients were commenced on dual antiplatelet therapy post-procedure. On follow up TOE 6 months after implantation, residual shunting was seen in 2.9 %. During a mean follow up of 20 ± 1 months, only one patient had a further stroke, with no cases of TIA or peripheral embolic event reported. No patients died from neurological causes in the follow up period.
Conclusions: The findings of this study, in contrast to recent data, show that in a high volume centre, with skilled operators, percutaneous closure of PFO is a safe and effective means of stroke prevention.

31 Incidence of Cardiomyopathy in Heamochromatosis; are we Cautious Enough?

Khan A, Kaur G, Khan Z, Papaneja N, Quigley C

Wexford General Hospital, Wexford

Hereditary haemochromatosis is a remarkably common condition with approximately 10–12 % of people of European background being heterozygous for the condition. It occurs secondary to a fractional increase in dietary iron absorption resulting in abnormal accumulation of iron in parenchymal organs, leading to organ toxicity. Cardiomyopathy is a major cause of morbidity and mortality in this population.
Objective: The aim of our study was to compare the current local practice protocols to the European Association for the study of Liver (EASL) guidelines and identify the incidence of cardiomyopathy in an Irish population.
Methods: We retrospectively analysed data of all patients enrolled in the heamochromatosis clinic of a regional medical centre between 2001 and 2010. We recorded demographics, co-morbidities, organ damage secondary to iron overload, frequency and control of body iron levels and adherence to international best practice guidelines in the diagnosis and subsequent management of this patient population.
Results: Data of 101 patients was included in the study. 68 (67.32 %) were males. An average period of 11.08 months was taken to achieve the recommended body levels of ferritin. 16 (15.8 %) patients developed Diabetes while 15 (14.8 %) patients developed arthritis during their followup. After multivariate analysis, 34 (33.66 %) of patients were found to have developed dilated cardiomyopathy secondary to heamochromatosis. Only 18 (17.8 %) had serial echos done as per the guidelines.
Conclusion: Hemochromatosis is a frequently encountered condition which needs improved understanding and knowledge of the current international guidelines. Adherence to international guidelines can result in early detection and appropriate management of cardiomyopathy in patients with heamochromatosis.

32 Non-Cerebrovascular Systemic Arterial Embolic Events Due to Paradoxical Embolization Via Patent Foramen Ovale (PFO)

[1,2]Margey R, [1]Elmariah S, [1]Hynes BG, [1]Renfigo-Moreno P, [2]Schainfeld R, [2]Jaff MR, [1]Inglessis I, [1]Palacios IF

[1]Interventional Cardiology and Structural Heart Disease, Division of Cardiology, Massachusetts; [2]Vascular Medicine, Division of Cardiology, Massachusetts General Hospital and Harvard Medical School, Boston, Mass

Background: Paradoxical embolism and cerebral ischemic events via a PFO has been well described. However, the frequency and clinical impact of such embolization to other vascular beds is poorly described in the current literature.

Aims: We describe a single center cohort of patients (pts) who presented with non-cerebrovascular paradoxical emboli, evaluating the relationship between high-risk PFO features, previously undiagnosed May-Thurner (chronic iliac vein compression) Syndrome, and hypercoagulability (cohort 1). We compare this cohort to patients presenting with stroke (CVA) and/or transient ischemic attack (TIA) (cohort 2).
Methods: 832 patients who underwent transcatheter closure of PFO between 2001 and 2010 at our institution were retrospectively analyzed. Demographic, clinical, procedural characteristics plus immediate and long-term follow-up are summarized. Two-sided T tests and Fishers' Exact tests were used to compare continuous and categorical variables cohort 1 and cohort 2.
A total of 832 PFO closures were performed. Cohort 1 included 29 PFO closures, representing 3.5 % of the overall cohort. There were six acute myocardial infarctions (MI), nine retinal emboli, six renal infarctions, three radial artery occlusions, three splenic infarcts, and two lower extremity arterial emboli. Mean age was 46.4 ± 14 years. Male: Female ratio 1:1.1. 72 % were not on anti-thrombotic or anti-coagulant therapy at presentation. 28 % were on aspirin monotherapy. 770 patients are included in cohort 2. Table 1 summarizes the hypercoagulable and vascular risk factors for the two cohorts. Patients in cohort 1 had shorter PFO tunnels on transthoracic echocardiography (TTE) (p value), and higher incidence of both May–Thurner syndrome ($p = 0.0001$) and hypercoagulable disorders ($p = 0.07$), and were more likely current or former smokers ($p = 0.001$). There was no difference in high risk TTE septum features between the two groups ($p = 0.3$).

Risk factor	Cohort 1 (N = 29)	Cohort 2 (N = 803)	*p* value
Age mean (SD)	45.6 (± 14)	49.9 (± 13.7)	0.1
Hypertension	27.5 %	29.7 %	0.5
Hyperlipidemia	27 %	24.3 %	0.07
Current or former Smoker	20.5 %	10.9 %	**0.001**
Family Hx of vascular disease	3.4 %	10.1 %	0.2
Diabetes	3.4 %	5.7 %	0.5
Hypercoagulable Disorder	44.8 %	31.3 %	**0.07**
Echo Tunnel Length (mm)	7.8 (± 4)	11.2 (± 4.8)	**0.03**
High Risk Septum features	44.8 %	40.6 %	**0.3**
May–Thurner Syndrome	44.8 %	12.1 %	**0.0001**

Effective defect closure was 100 % with no significant residual shunting. No further arterial embolic events and no further device embolization occurred. Median follow-up was 376 days (11–2,195 days).
Conclusions: This represents the largest case series of PFO associated non-cerebrovascular paradoxical emboli. Screening for hypercoagulable defects and co-existent May–Thurner syndrome in these cases is warranted due to their high occurrence, higher than seen in cohort two patients. These patients can be successfully treated with transcatheter closure, with no recurrent events in follow-up.

33 Trans-Catheter Aortic Valve Implantation: Adverse Outcomes of 120 Cases in Two Centres

[1]Sugrue R, [1]Teehan S, [1,2]Murphy RT, [1]Lynch G, [2]McCarthy J, [1]Tolan M, [2]Quinn M, [1]Foley B, [1,2]Crean P

[1]Departments of Cardiology and Cardiothoracics, St James' University Hospital, Trinity College, Dublin; [2]Blackrock Clinic, Dublin

Background and aim: Transcatheter aortic valve implantation is an alternative in patients with severe aortic stenosis for whom open surgical valve replacement is not suitable. Procedural mortality has been described as 0.9–1.5 %, 30-day mortality at 5.4–11.3 % and mortality at 1 year at 10.3–30.7 %0. In this study, we examined mortality in all cases of TAVI to date at two centres [1–4].
Methods: Patients who underwent transcatheter aortic valve implantation (TAVI) were identified from an institutional registry in two centres. Age, gender and clinical variables were collected. Peri-procedural complications were recorded. Mortality at time of clinical follow-up was recorded in both institutions at 30 days, 6 months and 1 year.
Results: There were 120 cases of TAVI from September 2008 to April 2012 inclusive. The mean age was 81.9 years and the median 82.5 (range 53–95). Males accounted for 59 cases, females for 61. TAVI was performed transfemorally in 104 cases, transapically in 12 and via subclavian in 3 and transaortic in 1. Femoral access site complications occurred in nine patients (7.5 %) of which one required surgical exploration and repair (1.6 %). One patient developed aortic dissection during the procedure and one died intraoperatively. Within 30 days of the procedure 7 patients died (5.8 %). 6 % of patients died with 6 months (6 of 100 patients) and 16.4 % within 1 year (15 of 91 patients). The mean age of those who died was 84.3 years. Only one person had a transient cerebrovascular event at 30 days—none had stroke. One patient had a second TAVI for severe intravalvular and paravalvular aortic regurgitation 4 months after the initial implant.
Conclusion: In our study the overall mortality at 30 days from 120 TAVI procedures was 5.8 %. The mortality at 1 year from 91 TAVI procedures was 16.4 % at 1 year. These rates correlate with international experience to date. At 30 days, no patient had stroke.
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34 Radiation Exposure During Transcatheter Aortic Valve Implantation (TAVI) Procedures

Sharma D, Ramsewak A, O'Conaire S, Spence M, Manoharan G

Royal Victoria Hospital, Belfast

Introduction: Transcatheter aortic valve implantation (TAVI) is a new alternative treatment for symptomatic aortic stenosis in patients who are considered high risk or inoperable for conventional surgical aortic valve replacement. The radiation exposure in these procedures should be kept as low as reasonably achievable (ALARA). The range of radiation dose during this procedure is largely unknown.
Methods: Data on radiation exposure was prospectively collected for consecutive patients undergoing TAVI at our center. The fluoroscopic and cine-acquisition settings were changed to a lower frame rate (3.75 frames/s for access site management and 15 frames/sec for

valve positioning) to assess reduction in radiation doses. We compared the radiation doses in this lower settings (LS) group with standard settings (SS) group.
Results: Twenty-nine consecutive patients with a mean age of 83 (range 63–91 years); BMI-27.4 (19–42); and 13 males underwent TAVI using SS between August and December 2011. Twenty-eight consecutive patients with a mean age of 81(range 64–93 years), BMI-27.6 (17–44), and 12 males underwent TAVI using LS from December 2011 to April 2012. The mean dose area product using the lower setting was 8786 cGy cm^2 as compared to 12658 cGy cm^2 for the standard group. The screening time [LS: 19.5(14–45) vs. SS: 21 (15–45) min) and procedure time (LS: 110.5 min vs. SS: 120 min) were similar in both groups. The median volume of contrast used in the LS and SS group were 169 ml and 215 ml, respectively.
Conclusion: This study demonstrates a significant reduction in radiation dose with the new acquisition settings without compromising image quality. However, radiation exposure still remains higher compared to percutaneous coronary interventions due to length and complexity of this procedure. We are currently evaluating the impact of using a RADPAD (Worldwide Innovations & Technologies, Inc., Kansas, USA) to further reduce radiation dose.

35 Hypertension Patterns Post Aortic Coarctation Repair

Canniffe C, Walsh K

Mater Misericordiae Hospital, Dublin

Up to 55 % of patients who have undergone aortic coarctation repair have been shown to develop hypertension, despite anatomically successful repair. We sought to characterise the patterns of hypertension in this group by assessing office and ambulatory blood pressure (ABP) measurements in a cohort of our patients.
Methods: An observational study on a retrospective cohort, with prospective data collection. Patients were identified from clinic logs. All patients had a right arm office blood pressure (BP) measurement and a 24 h ABP.
Results: We identified a cohort of 174 patients who attend the Mater Misericordiae Adult Congenital Cardiac Service who have previously undergone aortic coarctation repair. So far, 50 % of patients have been contacted and consented to participate.
To date 34 patients have worn 37 24 h ABP monitors.
Patient characteristics

Descriptive variable	
Age—mean [standard deviation (SD)]	30.6 years (10.7)
Male sex (%)	58.8 %
Surgical repair (%)	82.6 %
Stent implantation (%)	17.6 %
Age at primary intervention, median (range)	5 years (0.1–39)
Bicuspid aortic valves	52.9 %
Associated congenital cardiac lesion	17.6 %
Known hypertension (%)	67.6 %
Number of anti-hypertensive agents, mean (SD)	1.26 (1.16)

50 % of patients were found to be hypertensive on right arm office blood pressure (BP) measurement. The mean systolic BP on office measurement was 140.1 mmHg (SD 24.27). On ABP measurement 30 % of patients were found to have systolic hypertension. 32.3 % of patients were found to demonstrate white coat hypertension. 2.9 % were found to have unmasked hypertension. 38.2 % had a BP load of >30 %. 23.5 % did not demonstrate a nocturnal dip of 10 % or greater.

Of those who were found to have systolic hypertension on ABP, 80 % were male. 80 % were already on antihypertensive medications -mean number of antihypertensive medications 2.57 (SD 0.78).
Conclusion: Recruitment for this study is on-going. We hope to have enrolled over 120 patients by September 2012. To date, the prevalence of hypertension in our cohort is comparable to international studies. We have also found that despite medical therapy a significant proportion of our cohort had suboptimally controlled blood pressure. Given that many of the long term complications of aortic coarctation repair are related to hypertension it is important that we target the management of BP to improve the long term outcomes of these patients.

36 Perceived Barriers to Exercise in a Cardiovascular Primary Prevention Programme

Tuohy S, Sharma K, O'Conghaile A, Windle J, Gibson I, Flaherty G, Crowley J

University College Hospital, Galway

Purpose: Little is known about the barriers for maintenance of physical activity in a cardiovascular primary prevention programme in a high risk population. This study aimed to examine perceived social, psychological, and health-related barriers to the maintenance of physical activity among participants in a primary prevention programme with high cardiovascular risk.
Methods: Data were collected from participants at initiation of the programme, at the end of the 12-week programme and at 1 year post completion of the programme to identify perceived barriers to physical activity. 143 participants (80 male, 63 female) with complete 1 year follow up data were included in the analysis. Additional objective measurements including anthropometric data, exercise tolerance, smoking cessation and anxiety and depression scores were also evaluated.
Results: Three categories were derived from the stated barriers: physical, environmental, and psychological. Of the participants 51 % reported environmental barriers, with 35 % reporting psychological barriers, and 15 % reporting physical barriers. 64 % of all recorded primary barriers were overcome throughout the programme. The most commonly reported barriers were laziness/lack of motivation (28 %), time (23.8 %) and weather (18.8 %).Females were significantly more likely than men to overcome their primary barrier (Fisher's exact test, $p = 0.04$).Females were more likely to cite a psychological barrier while males were more likely to cite an environmental barrier. Environmental barriers were significantly less likely to be overcome than physical barriers (Fishers, $p = 0.04$)
Conclusion: Acknowledgement of barriers to exercise is needed to guide interventions for promoting physical activity maintenance among those with high cardiovascular risk. Males experiencing environmental barriers may need more targeted interventions.

37 Cigarette Smoking: Association Between Inflammation, Subclinical Atherosclerosis and Cardiovascular Events

McEvoy JW, Blaha MJ, Lima JAC, Bluemke DA, Hundley WG, Min JK, Shaw LJ, Lloyd-Jones DM, Barr RG, Budoff MJ, Blumenthal RS, Nasir K

Johns Hopkins Hospital, Baltimore, USA

Background: Cigarette smoking is well known to increase the risk of cardiovascular events. Whether smoking continues to be associated with adverse events after taking into account the burden of subclinical atherosclerosis and vascular inflammation is unclear.
Methods: MESA is a population-based study of 6,815 adults free of baseline cardiovascular disease, recruited from 6 US sites. We stratified participants based on smoking status into 3 groups: Never (NS), former (FS), and current smokers (CS). FS and CS were further stratified into quartiles of pack-year history of tobacco exposure (PYH). We excluded 28 participants with missing information on smoking ($n = 23$) or follow-up events ($n = 5$). We analyzed the association of smoking status with coronary heart disease (CHD) and cardiovascular disease (CVD) events after taking into account traditional risk factors, CRP, as well as burden of CAC.
Results: A total of 6787 participants were followed for median 5.8 years. CS comprised 887 (13 %, mean age 58 years), FS 2484 (37 %, 63 years) and NS 3,416 (50 %, 62 years). Significantly more CS suffered both CHD and CVD events than NS [4.5 vs. 3.3 % ($p = 0.003$) and 6.5 vs. 4.9 % ($p = 0.019$), respectively]. Multivariable HRs of 1.8 (CHD, $p = 0.004$) and 1.9 (CVD, $p < 0.001$) were found in CS, compared to NS. These findings were increased with higher PYH, suggesting a dose–response effect of smoking on events. Incremental reductions in these HRs were found on addition of CRP (e.g. CVD HR = 1.8, $p < 0.001$) and then CAC (e.g. CVD HR = 1.5, $p = 0.012$) to the multivariable adjusted regression model. No differences in event HRs were found between FS and NS.
Conclusions: CS, but not FS, was strongly associated with events. This association weakened slightly with the inclusion of CRP, and more significantly with the inclusion of CAC. However, the persistent association of smoking with events even after accounting for the burden of inflammation and CAC confirms the importance of additional pathways contributing to the cardiovascular risk associated with smoking.

38 Impact of a Phase 2 Cardiac Rehabilitation Programme on Exercise Performance Across Patient Subgroups: Who Benefits Most?

Neylon A, McGorrian C, Gallagher A, Murphy A, Blake G, Mahon N, McCann H, Sugrue D

Department of Cardiology, Mater Misericordiae University Hospital, Dublin

Introduction: An important component of cardiac rehabilitation (CR) programmes is exercise training. Improvements in aerobic exercise capacity are associated with reduced cardiac and all-cause mortality in patients who have suffered a myocardial infarction (MI). We aim to describe the impact of an Irish Phase 2 CR programme on exercise performance in patients with coronary artery disease (CAD).
Methods: This was an audit study of prospectively collected data on consecutive patients with CAD referred for CR from 2003 to 2011 inclusive. Data were gathered on baseline demographics, indications for referral, treadmill test type and treadmill test total metabolic equivalents of task (METs) pre- and post-CR. A change score for post-CR METs was calculated, and differences in means were compared using the Student's t test and ANOVA. Analyses were performed using Stata 9 statistical software.
Results: In total, 3187 patients with CVD were referred for CR, with a programme participation rate of 57 % ($n = 1825$). Mean age was 62.9 years (SD 11.9). Mean METs pre-CR were 7.01 (SD 2.96), compared with 8.91 (SD 3.15) post-CR ($p < 0.005$). The mean increase in METS was greatest in men (mean change in METs 2.13 (SD 1.85) vs 1.58 (SD 1.58) in women; $p < 0.005$). Patients post CABG had a greater improvement in exercise capacity than those post MI/PCI (mean change in METs 2.18 (SD 1.68) in CABG vs. 1.97(SD 1.81) in MI group; $p < 0.036$). A statistically significant inverse association was noted between change in METs and increasing age group ($p < 0.001$). Nevertheless, even in participants aged over 75 years ($n = 173$), a mean increase in METs of 1.69 (SD 1.55) was observed.
Conclusion: We observed an increase in exercise capacity across all patient groups participating in phase 2 CR. Improved METS in older patients underline the benefits of encouraging all eligible patients to attend a CR programme.

Session 6: Young Investigator's Award

39 Patients with Hypertension and Heart Failure with Preserved Ejection Fraction Present with Elevated Inflammatory and Alternative Monocyte/Macrophage-Apecific Markers in their Peripheral Circulation

Glezeva N, Voon V, Watson C, Ledwidge M, McDonald K, Baugh J

Conway Institute, University College Dublin, Dublin

Introduction: Inflammation contributes to the pathophysiological myocardial remodelling in early and late heart disease. A progressive state of immune-inflammatory activation and fibrosis with increased monocyte activation and infiltration into cardiac tissue has been associated with the progression to LVDD and HF. Monocytes are main regulators of host immunity, tissue inflammation and remodelling. Three monocyte subtypes exist: classical inflammatory (CD14++CD16−); intermediate(CD14+(+)CD16+); and alternative anti-inflammatory, fibrotic/healing(CD14+CD16++) monocytes. Monocytes differentiate into inflammatory (M1) or regulatory/pro-fibrotic (M2) macrophages. Alternative monocytes and M2 macrophages have been separately implicated in the pathogenesis of vascular inflammatory diseases including atherosclerosis, MI, CAD, HF, myocarditis, stroke. It was suggested that macrophage polarization to M1/M2 depends on the expression pattern of specific monocyte markers and cytokine mediators.
Method: We analysed monocytes from patients at different stages of heart disease and associated peripheral blood markers to disease pathogenesis.
Peripheral blood was collected from 83 patients with asymptomatic hypertension (aHTN), LVDD, and HFPEF. Echocardiography was performed on all patients. PBMC and monocytes were purified and stained for CD14, CD16, CD163, CD206. Inflammatory cytokines in plasma were identified.

A progressive state of inflammation in LVDD and HFPEF compared to aHTN was defined by elevated peripheral levels of TNFα (2.26–2.15–3.10 pg/ml), IL12 (80–81–117 pg/ml), IL6 (2.7–3.8–4.8 pg/ml), MCP1 (186–186–230 pg/ml). These also correlated with peripheral BNP. Levels of M2-associated cytokines were also

increased: CCL17 (49–49–65 pg/ml), CCL18 (8.8–10.2–12.3 pg/ml), sCD163 (470–488–579 ng/ml). Percentage of CD14+ monocytes was higher in aLVDD and HFPEF (13–19–21 %) and overlapped with increased numbers of CD14++CD16- and CD14+CD16++ monocytes. Monocytes expressing the M2 markers CD163 and CD206 were also increased in HFPEF.
Results: We identified increased numbers of pro-inflammatory monocytes and elevated M2-associated regulatory and fibrotic markers in peripheral plasma and monocytes of asymptomatic LVDD and HFPEF patients.
Conclusion: We suggest an increased activation and differentiation of monocytes towards regulatory, pro-fibrotic M2 macrophages occurs in early heart disease and these changes are associated with progression to HFPEF.

40 A Novel Biomarker and Potential Treatment for Diastolic Dysfunction and Heart Failure

Horgan S, Watson C, Collier P, Ledwidge M, McDonald K, Baugh J

The Conway Institute, University College Dublin, Dublin

Purpose: Heart failure with preserved ejection fraction (HFPEF) contributes to 20–50 % of the heart failure population. Excessive myocardial fibrosis results in stiffness and reduced compliance of the left ventricle which leads to left ventricular diastolic dysfunction (LVDD) and eventual HFPEF. We investigated the role of *HU1001, an innate immune system recognition molecule, as a biomarker for LVDD and HFPEF, and assessed its potential as a treatment for cardiac fibrosis.
Methods: For biomarker analysis, a cross sectional study of patients with asymptomatic hypertension (AH) and HFPEF, and a prospective study of patients with asymptomatic progressive LVDD were carried out ($n = 140$ patients). The anti-fibrotic potential of HU1001 was tested in an animal model of hypertensive heart disease. Three groups of 10 animals were studied including group 1: normotensive Wistar-Kyoto rats treated with vehicle (V-WKY), group 2: spontaneously hypertensive rats treated with vehicle (V-SHR) and group 3: SHRs treated with recombinant HU1001 (HU1001-SHR). Duration of treatment was 12 weeks.
Results: HFPEF patients had significantly lower ($p = 0.0003$) HU1001 levels than those with AH. HU1001 concentration was also found to decrease over time in patients with progressive LVDD ($p < 0.05$). Negative correlations between HU1001 and a number of fibro-inflammatory markers were present. Compared with V-WKY, V-SHR exhibited significant increases in left ventricular mass index (LVMi) and perivascular collagen index (PVCi). HU1001 administration was associated with a significant reduction in both LVMi ($p < 0.0001$) and PVCi ($p = 0.0016$). There was also a significant reduction in the neutrophil and monocyte chemotactic proteins CXCL-1 ($p < 0.05$) and MCP-1 ($p < 0.001$).
Conclusions: HU1001 levels become depleted in more severe disease states and track the progression of LVDD. Treatment with HU1001 inhibits deposition of PVC and reduces LVM in SHRs. Lower chemotactic protein concentrations found in HU1001 treated animals may reflect the ability of this peptide to prevent recruitment of pro-fibrotic macrophages.
*Note from author:

I have submitted this abstract based on research I am currently undertaking. My research group are currently filing for a patent on the protein I describe in the abstract. As a result, I have been advised to use the codename HU1001. The patent will be through well in advance of the Irish Cardiac Society meeting when we will be in a position to disclose the name of the protein. I apologise for this inconvenience.

41 Carotid Intima-Media Thickness Independently Predicts Significant Coronary Artery Disease and is as Good as a Bank of Novel Risk Markers

Leong T

Adelaide and Meath Hospital, Tallaght, and St. James's Hospital, Dublin

Background: Cardiovascular disease (CVD) remains the leading cause of death worldwide. Identification of those at increased risk can be improved, possibly through novel risk markers, or by tests such as carotid intima media thickness (CIMT) assessment.
Methods: The *Cath Lab Study* was an originally designed study which recruited 730 stable patients undergoing coronary angiography with chronic stable angina, suspected coronary artery disease (CAD) or for valve surgery. Of these, 386 had simultaneous CIMT assessed, and they comprised this study arm population. Significant CAD was defined using the SYNTAX score (≥ 1 vs. 0). Raised CIMT (CIMT-75) was defined as >75th percentile cut-points of the ARIC study, as suggested by ASE guidelines. Laboratory assays for novel risk markers were Roche (hs-CRP), Abott IMX (homocysteine) and R&D Systems (CD40 ligand, VCAM and P-selectin).
Results: There was a significant graded association between CIMT and blood pressure, hypercholesterolaemia and smoking, as well as the novel risk markers VCAM, P-selectin and homocysteine, Significant univariate correlations with CIMT included: age ($r = 0.37$, $p < 0.0001$), male sex ($r = 0.19$, $p = 0.0002$), systolic BP ($r = 0.19$, $p = 0.0002$), hypercholesterolemia ($r = 0.12$, $p = 0.02$), smoking ($r = 0.11$, $p = 0.02$), glucose ($r = 0.14$, $p = 0.006$), the metabolic syndrome ($r = 0.18$, $p = 0.0005$), homocysteine ($r = 0.20$, $p = 0.0001$), log CD40 ligand ($r = 0.11$, $p = 0.03$), VCAM ($r = 0.11$, $p = 0.04$), P-selectin ($r = 0.14$, $p = 0.01$). Table 1 shows the OR of significant CAD for CIMT-75 adjusted for Models 1 and 2 (all the traditional risk factors), and Model 3, also including the bank of novel risk markers (hs-CRP, homocysteine, CD40 ligand, VCAM and P-selectin). Tests of likelihood ratio between Models 2 and 3 showed no significant improvement of fit ($p = 0.55$). CIMT-75 has a high negative predictive value (88 %).
Conclusions: CIMT-75 can independently predict significant CAD defined using a prognostically significant score. CIMT-75 is as good as using a bank of novel risk markers to predict significant CAD.
Table 1

	OR of significant CAD	95 % CI	P value
CIMT-75 (univariate)	7.8	2.3, 26.8	0.001
Model 1: CIMT-75—adjusted for conventional risk factors: age, sex, blood pressure and smoking	6.3	1.2, 34.0	0.03
Model 2: CIMT-75—adjusted also for other traditional risk factors: HDL cholesterol, glucose	6.2	1.2, 33.3	0.03
Model 3: CIMT-75—adjusted also for novel risk markers: hs-CRP, homocysteine, VCAM, P-selectin, fibrinogen and log CD40 ligand	4.5	0.8, 25.7	0.09

42 Cardiovascular Magnetic Resonance of Myocardial Edema Using a Short Inversion Time Inversion Recovery (Stir) Black-Blood Technique: Diagnostic Accuracy of Visual and Semi-Quantitative Assessment

[1]O h-Ici D, [2]Ridgway JP, [1]Kuehne T, [1]Berger F, [3]Plein S, [4]Sivananthan M, [1]Messroghli DR

[1]Department of Congenital Heart Disease and Pediatric Cardiology, Deutsches Herzzentrum Berlin, Augustenburger Platz 1, Berlin 13353, Germany;[2]Medical Physics, Leeds General Infirmary, Great George Street, Leeds UK; [3]Leeds Institute, UK

Background: The short inversion time inversion recovery (STIR) black-blood technique has been used to visualize myocardial edema, and thus to differentiate acute from chronic myocardial lesions. However, some cardiovascular magnetic resonance (CMR) groups have reported variable image quality, and hence the diagnostic value of STIR in routine clinical practice has been put into question. The aim of our study was to analyze image quality and diagnostic performance of STIR using a set of pulse sequence parameters dedicated to edema detection, and to discuss possible factors that influence image quality. We hypothesized that STIR imaging is an accurate and robust way of detecting myocardial edema in non-selected patients with acute myocardial infarction.
Methods: Forty-six consecutive patients with acute myocardial infarction underwent CMR (day 4.5, +/1.6) including STIR for the assessment of myocardial edema and late gadolinium enhancement (LGE) for quantification of myocardial necrosis. Thirty of these patients underwent a follow-up CMR at approximately 6 months (195 +/39 days). Both STIR and LGE images were evaluated separately on a segmental basis for image quality as well as for presence and extent of myocardial hyper-intensity, with both visual and semi-quantitative (threshold-based) analysis. LGE was used as a reference standard for localization and extent of myocardial necrosis (acute) or scar (chronic).
Results: Image quality of STIR images was rated as diagnostic in 99.5 % of cases. At the acute stage, the sensitivity and specificity of STIR to detect infarcted segments on visual assessment was 95 and 78 %, respectively, and on semi-quantitative assessment was 99 and 83 %, respectively. STIR differentiated acutely from chronically infarcted segments with a sensitivity of 95 % by both methods and with a specificity of 99 % by visual assessment and 97 % by semi-quantitative assessment. The extent of hyper-intense areas on acute STIR images was 85 % larger than those on LGE images, with a larger myocardial salvage index in reperfused than in non-reperfused infarcts ($p = 0.035$).
Conclusions: STIR with appropriate pulse sequence settings is accurate in detecting acute myocardial infarction (MI) and distinguishing acute from chronic MI with both visual and semi-quantitative analysis. Due to its unique technical characteristics, STIR should be regarded as an edema-weighted rather than a purely T2-weighted technique.

Session: 7 Revascularisation

43 Impact of Stent Overlap on Long-Term Clinical Outcome in Patients Undergoing Newer-Generation Drug-Eluting Stent Implantation

O'Sullivan CJ, Stefanini GG, Pilgrim T, Räber L, Taniwaki M, Büllesfeld L, Khattab AA, Nietlispach F, Wenaweser P, Meier B, Windecker S

Swiss Cardiovascular Centre, Bern University Hospital, Bern, Switzerland

Objectives: We compared the long-term clinical outcomes of patients with and without overlap of first generation and newer generation drug-eluting stents (DES).
Background: First-generation DES overlap is associated with impaired angiographic and long-term clinical outcomes, including death or myocardial infarction, but the impact of newer generation DES overlap on long-term clinical outcome is unknown.
Methods: We analyzed the clinical outcomes of 3,133 patients treated with DES [1,532 patients treated with sirolimus eluting stents (SES) and 1,601 patients treated with everolimus eluting stents (EES)] in the Long-term comparison of Everolimus-eluting and Sirolimus-eluting Stents for coronary revascularization (LESSON) trial according to the presence or absence of stent overlap and the number of stents per vessel: 969 (30.9 %) patients with multiple DES in a vessel with overlap, 446 (14.2 %) patients with multiple DES in a vessel without overlap, and 1,718 (54.8 %) patients with 1 DES per vessel. The primary outcome was a composite of death, MI, and target vessel revascularization.
Results: The primary endpoint of death, myocardial infarction (MI) and target vessel revascularization (TVR) was more common overall in patients with DES overlap (207 events, 25.1 %) than in the other groups (80 events, 20.8 % and 280 events, 18.8 %) at 3 years ($p < 0.001$). This was largely driven by a higher incidence of the primary endpoint in the SES overlap group (102 events, 28.7 %) compared with the other SES groups (49 events, 22.6 % and 147 events, 17.6 %) at 3 years ($p < 0.001$). There was no significant difference in the primary endpoint when comparing EES overlap (105 events, 22.3 %) with the other EES groups (31 events, 18.5 % and 133 events, 20.4 %) at 3 years ($p = 0.32$).
Conclusions: The unrestricted use of EES overlapping stents is associated with improved long-term clinical outcomes when compared with SES overlapping stents.

44 Contemporary Predictors in Successful PCI of Chronic Total Occlusions

Leong T

Institut Cardiovasculaire Paris Sud, Paris, France

Background: Percutaneous Coronary Intervention (PCI) of CTOs remains relatively infrequent partly due to the challenging nature and paucity of data on the likelihood of success. Newer techniques are also available which may improve success. We sought to examine factors in order to improve patient selection and optimisation of conditions for success.
Results: Of 1,508 consecutive PCIs of CTO in our institution performed between January 2004 to January 2012, the success rate was 71 %. The characteristics of our study population were: median age 63, male 86 %, ACS 13 %, mean creatinine 98 μmol/L, previous CABG 8 %, previous MI 23 %, previous PCI 39 %, radial 82 %, mean procedural duration 92 min, mean X-ray dose 41 Gy cm^2, mean contrast dose 280 ml, vascular complications 0.4 %, serious bleeding 0.06 %. Significant univariate correlations for successful PCI were tapered morphology ($r = 0.1$, $p = 0.0001$), intraluminal bridge ($r = 0.14$, $p = 0.002$), operator experience ($r = 0.07$, $p = 0.01$), rotablator use ($r = 0.08$, $p = 0.002$), retrograde approach ($r = 0.07$, $p = 0.01$), while factors that contributed to failure were age ($r = -0.06$, $p = 0.02$), lesion length ($r = -0.17$, $p < 0.0001$), no visible stump (r = -0.08, $p = 0.002$), calcification ($r = -0.15$, $p < 0.0001$), proximal tortuosity ($r = -0.06$, $p = 0.02$), previous MI ($r = -0.1$, $p = 0.0001$), previous CABG ($r = -0.12$, $p < 0.001$). Table 1 shows selected factors in terms of their odds ratios of successful PCI of CTO

in a multivariable logistic model adjusting for the traditional predictors, other anatomical characteristics, clinical factors and lastly newer techniques. The model included age, sex, lesion length, calcification, stump visibility, tapered morphology, proximal tortuosity, intraluminal bridge, previous MI, previous CABG, and technical considerations such as operator experience, radial approach, femoral approach, and other techniques.

Conclusions: In this contemporary series, the traditional predictors of lesion length, calcification, stump visibility, tortuosity still hold true, even when other newer significant factors such as intraluminal bridge, previous MI, previous CABG, operator experience and other newer techniques are taken into account.

	OR of successful PCI of CTO	95 % CI	P value
Age (per 5 years increase)	0.91	0.85, 0.97	0.004
Lesion length (per 5 mm increase)	0.87	0.84, 0.91	<0.001
Calcification	0.79	0.69, 0.92	0.002
No visible stump	0.69	0.49, 0.98	0.036
Proximal tortuosity	0.65	0.46, 0.98	0.02
Intraluminal bridge	2.07	1.31, 3.27	0.002
Previous MI	0.62	0.46, 0.86	0.003
Previous CABG	0.39	0.24, 0.64	<0.001
Operator experience (per 50 cases increase)	1.16	1.08, 1.25	<0.001
Radial access	1.45	0.91, 2.30	0.11 (NS)
Anchoring balloon	1.97	1.15, 3.35	0.013
Tornus catheter	1.48	0.55, 3.96	0.44 (NS)
CART technique	3.7	0.6, 22.6	0.16 (NS)
Mother-and-child cath	15.0	1.3, 174.6	0.03
Retrograde wire	7.4	2.2, 24.9	0.001

45 Long-Term Clinical Outcomes of Percutaneous Coronary Intervention with Drug-Eluting Stents in Patients with Mechanical Heart Valves

O'Sullivan CJ, Moschovitis A, Zanchin T, Stortecky S, Stefanini GG, Pilgrim T, Räber L, Taniwaki M, Büllesfeld L, Khattab AA, Nietlispach F, Wenaweser P, Meier B, Windecker S

Swiss Cardiovascular Centre, Bern University Hospital, Bern, Switzerland

Aims: Clinical outcomes following percutaneous coronary revascularization (PCI) with the unrestricted use of drug-eluting (DES) stents in patients with mechanical heart valve prosthesis (MP)—requiring life-long oral anticoagulation—have not been previously described. We sought to investigate long-term clinical outcomes of PCI with DES in patients with MP.

Methods and results: Among 6,308 consecutive patients undergoing PCI with DES, 41 patients (0.7 %) were taking oral anticoagulation at baseline because of a previously implanted MP [aortic position: 28 (68 %), mitral position: 13 (32 %)] and were prospectively followed up to 4 years in the Bern DES registry (mean duration of follow-up 3.0 ± 1.6 years, no patients were lost to follow-up). All patients were discharged on triple anthithrombotic therapy—comprising aspirin, clopidogrel, and oral anticoagulation—for a minimum period of 3 months, after which clopidogrel was stopped. Our pre-specified primary endpoint was a composite of all-cause mortality, myocardial infarction, ischemic stroke, or bleeding type 3 and 5 according to the guidelines by the academic research consortium (BARC). Mean age at baseline was 70.5 ± 8.8 years, 24.4 % of patients were female. Indication for PCI was an acute coronary syndrome in 29.3 % of patients. 90.2 % patients and 95.1 % of patients were discharged on aspirin and clopidogrel, respectively. The primary endpoint was observed in 16 patients (39.0 %) at 4 years. All-cause mortality and myocardial infarction occurred in 11 (26.8 %) and 2 (4.8 %) patients, respectively. Three patients (7.3 %) had BARC bleeding type 3/5, two of which occurred on the day of the index PCI. One patient (2.4 %) suffered an ischemic stroke. No definite stent thrombosis occurred during the observed period.

Conclusion: Despite a high risk of adverse outcome, the unrestricted use of DES among patients with MP was associated with modest rates of significant bleeding events.

46 Radial Artery Occlusion

Dooley M, Spence M, Roberts M

Belfast Health and Social Care Trust, Belfast

Aim: To identify Radial Artery Occlusion (RAO) rates in patients attending for coronary angiography (CA) ± percutaneous coronary intervention (PCI) via transradial access.

Background: Radial artery cannulation caries a risk of RAO with an incidence of 1–19 %. This is usually of no clinical consequence, because the hand receives a dual blood supply with extensive collateral channels but it limits future use of transradial access, radial graft for CABG, AV fistula formation. Known risk factors for RAO are radial artery:sheath ratio, inadequate anticoagulation, conventional vs perfused haemostasis, female gender, low body weight, short procedure and younger age.

Methods: Patient Inclusion criteria: transradial access for CA ± PCI, all comers. No exclusion criteria.

- Pre-procedure:
  - Patient information data set obtained, radial artery assessed by palpable pulse and plythesmography (Barbeau's test).
- Post procedure (< 24 h):
  - Procedural and haemostasis data set obtained. Radial artery assessment repeated.

Results:

RAO in 14 patients (n = 51).

Patient information:

Median age 68 IQR (60–75) patent, 56.5 IQR (49–63) in occluded. Female 27 % RAO, Male 26.5 % RAO. Smokers (n = 9): 66 % RAO. Median weight 80 kg IQR (70–88) patent, median 93 kg IQR (75–102) RAO.

Procedure information:

Sheath size 5F (n = 15) 33 % RAO, 6F (n = 35) 26 % RAO and 7F (n = 1) 0 % RAO.

Heparin use median 2000u in RAO (vs. 5000 in patent), if received <5,000 U (n = 18) 50 % had RAO. Procedure time median 40 min IQR (24–70) in patent, median 25 min IQR(19-43) in RAO. PCI (n = 23) 23 % RAO, CA 36 % RAO.

Haemostasis information:

Median 15 mls of air in TR Band. Initial inflation duration median 60 min IQR (30–120) RAO, 74 min IQR (50–120) in patent. Total inflation duration median 132 min IQR (120–210) RAO, 224 min IQR (150–300) in patent.
Conclusion: At 27.4 % within 24 h post procedure the RAO rate was higher than expected. Although at 30 days this figure would be reduced by recannulation improvements can be made principally through adequate heparin use.

47 Optical Coherence Tomography (OCT) Guided Assessment of Coronary Intervention

Hillery P, Waterhouse DF, Abidin NZKZ, Asgedom SD, McAdam B, Foley DP

Beaumont Hospital, Beaumont, Dublin

Introduction: Optical coherence tomography (OCT) is an optical analog of intravascular ultrasound (IVUS) that may be used to examine the coronary arteries and has tenfold higher resolution than IVUS. OCT allows tissue differentiation (fibrous, calcified, or lipid-rich plaque) and may identify of plaques that have been associated with rapid lesion progression and clinical events. Following percutaneous coronary intervention, OCT facilitates assessment of stent positioning, stent strut coverage and in-stent stenosis. In this study, we wished to determine the role for routine OCT assessment following percutaneous coronary intervention (PCI) and the clinical impact of such a strategy.
Methods and results: All patients presenting for both emergent and PCI of a native coronary stenosis, and suitable for OCT imaging were included (n = 132). All patients underwent OCT post coronary intervention (mean 45 days). The incidence of stent malposition was 17.4 % (n = 23). In 28 patients, the stents were covered completely with neointima. OCT demonstrated underexpanded stent struts in 23 patients. Following OCT, 59 patients underwent further coronary interventions. Most commonly the OCT findings leading to further intervention were stent malaposition, plaque prolapse and edge dissection.
Conclusion: OCT is a novel, promising imaging modality. The findings of this study demonstrate that OCT may impact clinical outcomes in patients who have undergone coronary intervention.

48 The Changing Profile of Patients Undergoing Urgent Coronary Artery Bypass Surgery in the Primary Percutaneous Intervention Era

Beattie R, Wilson C, Graham ANJ

Royal Victoria Hospital, Belfast

Aims: Primary percutaneous intervention (PPCI) was introduced in the Belfast Trust in December 2009, providing a round-the-clock regional service for patients presenting with acute myocardial infarction. In addition, publication of the results of the Syntax study may have influenced treatment strategies. We aimed to investigate if these factors have altered the profile of patients requiring urgent and emergency coronary artery bypass grafting.
Methods: The cardiac surgical database was searched retrospectively for all patients undergoing urgent, emergency or salvage isolated coronary artery bypass grafting in the period 2008–2009 (2 years preceding the introduction of PPCI) and 2010–2011 (2 years following). Patient characteristics, intraoperative and post operative data were compared between the two groups using both student *t* test and Chi squared statistical analysis.

Results

Period	*Operative priority*				Total
	Elective	Urgent	Emergency	Salvage	
2008–2009	667	328	30	1	1,026
2010–2011	665	299	16	1	981

In the 2010–2011 period there was a decrease in the number of non-elective CABG cases (359 vs. 316). There was an increased proportion of male patients (2008–2009: 74.4, 2010–2011: 82.6 %; $p = <0.01$), with lower EuroScore (12.12, 9.46; $p = <0.01$), CCS (mean 3.24, 2.73; $p = <0.01$) and NYHA classes (2.32, 2.03; $p = <0.01$). Preoperative inotropic, ventilator or balloon pump requirements were not significantly different. Although no significant difference was seen in left main stem disease (57.9, 60.5 %; $p = 0.50$), patients had more extensive coronary disease (mean number of vessels involved 2.72 vs. 2.82, $p = 0.01$). This was reflected in the increased cross clamp (62.4 and 68.1 min, $p = <0.01$) and bypass times (111.3 and 120.1 min, $p = 0.01$).
Conclusion: The introduction of a PPCI service has been associated with a reduction in urgent and emergency CABG surgery in our unit. Patients requiring surgery are now less symptomatic with reduced operative risk but with more extensive coronary disease.

49 Myocardial Tissue Hypoxia is Associated with Changes in the Epigenome

Watson C, Neary R, Collier P, Tolan M, Ledwidge M, McDonald K, Baugh J

UCD Conway Institute of Biomolecular and Biomedical Research, Belfield, University College Dublin

Prolonged ischemia caused by coronary artery disease and myocardial infarction leads to aberrant ventricular remodelling and cardiac fibrosis. This is thought to occur through the accumulation of gene expression changes in resident fibroblasts, resulting in an overactive fibrotic phenotype. Long term adaption to this hypoxic insult is likely to require significant modification of chromatin structure in order to maintain the fibrotic phenotype. We propose that epigenetic modifications play an important role in dictating hypoxia-induced fibrosis within the heart. Therefore, the purpose of this study was to investigate whether a hypoxic environment within cardiac tissue was associated with epigenetic changes and an enhanced fibrotic phenotype.

For this study, myocardial tissue was procured from 36 stable patients undergoing elective cardiothoracic surgery. Specimens were obtained adjacent to the venous cannulation site in the right atrial appendage. All subjects gave written informed consent to participate in the study. The relationship between the degree of hypoxia, DNA methylating enzymes, and collagen 1 were investigated using quantitative real-time PCR (QPCR). Carbonic anhydrase IX (CAIX) expression was used as a surrogate marker of hypoxia. Immunohistochemical staining of cardiac tissue was used to study the relationship between tissue regions of hypoxia (CAIX protein positivity) and levels of DNA methylation (nuclear 5MeC positivity). A positive pixel count algorithm (Aperio) was used to quantify the intensity of positive immuno-staining.

Results obtained provide ex vivo evidence in cardiac tissue that hypoxia is associated with an altered epigenetic landscape. The degree of tissue hypoxia (CAIX levels) significantly correlated with

collagen 1 and DNA methyltransferase 3B gene expression. Hypoxic regions within cardiac tissue (CAIX positive) were associated with regions of DNA hypermethylation.

Whether or not these changes in DNA methylation are required for maintaining a viable hypoxic phenotype, or whether they are directly involved in the enhanced fibrotic response requires further investigation.

50 Refining Transcatheter Left Atrial Appendage Closure: Eliminating the Anaesthestist and Reducing the Cost

Waterhouse DF, Kennedy MW, Asgedom SD, Neylon A, Alqaseer M, McAdam B, Foley DP

Department of Cardiology, Beaumont Hospital, Dublin

Introduction: The validity and benefit of LAA closure for thromboembolic prevention in non-valvular AF is well established. To date, all studies for this procedure took place under general anaesthesia. Given that most candidates for LAA occlusion are elderly, with multiple co-morbidities, general anesthesia confers additional risk and cost to the procedure. We examined the safety and cost implications of performing this procedure under conscious sedation.
Methods: Fifty-four (44 men, 10 women; mean age 75.7 ± 6.2 years) with nonvalvular AF, at high risk for cardioembolic stroke (mean CHA_2DS_2VASc score 3.8 ± 1.5), and high risk for oral anticoagulation, underwent percutaneous LAA closure using the WATCHMAN device. All procedures were performed under conscious sedation, with fluoroscopy and transoesophageal echocardiography (TOE) guidance. The follow-up included clinical and echocardiographic review within 45 days.
Results: The LAA was successfully occluded 50 patients (92.5 %) under conscious sedation (fentanyl and midazolam). ASA PS score II-III. In four cases, the device was not implanted due to unsuitable appendage anatomy. The mean procedural and fluoroscopy times were 61.3 ± 16.1 and 10.5 ± 5.4 min, respectively. The mean device size was 24.6 ± 3.8 mm. There were no procedure, device or conscious sedation related complications. There were no statistically significant variations in monitored blood pressure, heart rate or oxygen saturations during the procedure. All procedures were performed as day-case procedures. Follow-up TOE showed closure of all LAA orifices. No patient experienced any major adverse event during a follow-up (5–22 months).

Cost saving implications were €3,174/patient, based on reduced hospital stay, from standard 2 days of hospitalization (€1046/day) and general anaesthesia saving (€1082/procedure).
Conclusion: Our study demonstrates that conscious sedation is a safe, well tolerated alternative to general anaesthesia for percutaneous LAA occlusion. Additionally, this approach facilitates LAA closure as a day-case procedure, with a consequent reduction in procedure-related costs and a significant saving in bed days.

51 Incidence and Outcome of Re-entry Injury in Redo Cardiac Surgery

Imran Hamid U, Leung SCS, Soo LM, Graham A

Royal Victoria Hospital Belfast, Belfast

Introduction: Redo cardiac surgery may be associated with lethal injuries to mediastinal structures. The purpose of this study was to determine the frequency of injury during re-entry and identification of pre-operative risk factors.
Methods: Review of a prospectively maintained cardiac surgery database was performed. Five hundred and forty-four patients were identified that underwent redo cardiac surgery between 2001 and 2011. Demographic details, re-entry injury, Euroscore, in hospital mortality and nature of surgery were analysed.
Results: The mean age was 62 years; 326 were male, 218 were female. 464 patients underwent first time redo while 80 patients had multiple previous surgeries. 162 patients had pre-operative computed tomography (CT) to identify proximity of vital structures to the sternum; right ventricle in 25 % of patients, innominate vein in 7 % and grafts in 5 % of cases. 35 patients had peripheral arterial (33 femoral and 2 axillary) cannulation to establish cardiopulmonary bypass (CPB). 15 Intraoperative adverse events occurred. These included injuries to aorta (n = 2), right atrium (n = 1) innominate vein (n = 2), internal mammary artery (n = 2), pulmonary artery (n = 2), lung parenchymal injury (n = 1), graft injury (n = 2), Injury to right ventricle (n = 2), ventricular fibrillation (n = 1). Mortality in this group was 26 % (n = 4) compared to 9 % (n = 48) without re-entry complications. There were no mediastinal injuries reported in the 6 % of cases where CPB was established prior to sternotomy. Mean logistic Euroscore was 20.4. In hospital mortality was 9.5 %.
Conclusions: Risk of re-entry injury during repeat sternotomy is low, however, re-entry injury significantly increases mortality. Pre-operative planning using CT scan is important in identifying structures at risk during re-operations. Careful dissection and establishing CPB prior to sternotomy minimizes such injuries in selected patients.

52 Radial Approach to CTO Re-canalisation is as Successful and Safer than Femoral: Single Centre Observational Study

Asgedom SD, Bjornsstad PM, Patten R, McAdam B, Sheahan R, Foley DP

Beaumont Hospital, Beaumont, Dublin

Objectives: Despite increasing application of the radial route for PCI, recanalization of chronic total occlusion has remained largely a trans-femoral procedure, to allow use of larger catheters and achieve powerful support. We adopted the radial approach as routine for all PCIs including CTOs in 2007 and observed satisfactory treatment of CTOs. In this study, we sought to compare procedural outcomes of radial versus femoral approach to CTO in a consecutive patient series.
Methods and results: One hundred and forty-five (86 radial and 59 femoral) consecutive patients undergoing recanalization or attempted recanalization of chronic total occlusion were reviewed. Mean age is 65.5 years and males constitute 84.4 %. There were no significant differences in baseline clinical characteristics or in target vessel between the two groups. All occlusions were >6 months old and up to 20 years. Bilateral radial access was used in 19.3 %; unilateral radial in 78 % and 2 cases had radial + femoral 5F diagnostic for contra lateral injection. RCA was the target artery in 53.0 and 97.2 % had multi-vessel disease. Overall success rate was 71.7 % and trans-radial versus trans-femoral was 82.0 vs. 55.9 % (P value 0.001). The mean fluoroscopy time was 24.9 min and was similar for both groups. No significant difference in contrast use and flouroscope time was observed. Access site complications were higher among trans-femoral group than trans-radial. One case of pseudo-aneurysm and two major bleedings were encountered in the femoral group whereas systemic and coronary complications are similar for both groups.

Conclusion: Radial approach for CTO re-canalisation did not hamper success and actually was associated with higher success rates than double femoral approach, probably thanks to improved guide-wire and support micro-catheter technology during the 5 years covered. Lower complication rates, with similar radiation exposure and contrast use encourage us to persist with the bilateral radial approach to CTO as the default strategy.

53 An Audit of Acute Kidney Injury (AKI) Following Contrast Coronary Angiography

Connolly M, Mc Eneaney D, Harbinson M, Morgan N

Cardiovascular Research, Craigavon Cardiac Centre, Southern Trust, Northern Ireland

Background: 3,720 coronary angiograms were performed in Northern Ireland in 2010. Coronary angiography and primary coronary intervention (PCI) use iodinated contrast media but such agents can induce renal tubular damage in susceptible individuals (contrast induced nephrotoxicity, CIN). The strongest risk factor for CIN is the presence of pre-existent chronic kidney disease (CKD), the UK incidence of which is 5–8 %. Other risk factors include increasing age, diabetes, hypertension and peripheral vascular disease [1]. Acute kidney injury (AKI), defined as a serum creatinine rise >25 % from baseline, begins within 24 h of contrast administration but is under-recognised at this early stage using creatinine based methods. CIN is associated with increased morbidity, mortality and duration of hospital stay. The increasing burden of atherosclerotic diseases and consequent requirement for angiography/PCI positions CIN as a major healthcare issue.
Aims: The aims of this study were to record the number of patients having coronary angiography who have CKD, and document the proportion who developed AKI.
Methods: Patients undergoing coronary angiogram at Craigavon hospital between 01/08/2010 and 01/02/2011 were selected. Renal function was recorded prior to angiogram. Patients identified with significant CKD (estimated glomerular filtration rate <60 mls/min) had follow up renal function testing 48 h post contrast to assess for AKI development.
Results: 634 angiograms were performed. 77 patients (12.1 %) had an eGFR <60 mls/min. Nine patients (11.6 %) developed AKI. Mean age was 77.1 years (range 69–85 years). Affected patients demographics and risk factors were recorded (Table 1).

Table 1 Patient summary and associated AKI risk factors

	No of patients eGFR <60 (%)
Developed AKI	9 (11.6)
CRF Stage 3	8 (88.8)
CRF Stage 4	1 (11.1)
Hypertension	6 (66.6)
Diabetes	1 (11.1)
Mean contrast dose (range)	132mls (100-190mls)
ACE-I/ARB	7 (77.7)
Diuretic	4 (44.4)
MACE at 6 months	2 Deceased (22.2)

Conclusion: CIN is common post angiography. It exceeds 10 % in CKD patients and is set to rise. Unfortunately serum creatinine is a delayed marker of GFR decline [2], novel biomarkers to detect early CIN are urgently required. This could facilitate early intervention to protect renal function, reduce morbidity, improve prognosis and reduce length of hospital stay. Such markers will be the focus of further study.

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54 Long-Term Survival of Patients Successfully Discharged Following Aborted Out of Hospital Cardiac Arrest

J Keaney, S Cuddy, L Browne, A Hanley, J O'Sullivan, N Mahon, E Keelan, C McGorrian, J Galvin

Mater Hospital Dublin

Background: While there is an extensive awareness of factors which improve survival to discharge for patients with out-of-hospital cardiac arrest (OOHCA), there remains a lack of data internationally on the long-term outcomes of these patients.
Methods: This is a retrospective observational study in which outcomes of patients discharged from the Mater Hospital following OOHCA from July 2003 to August 2011 were determined by means of hospital record review, or contacting the patients primary care physician.
Results: During the period under review 1,217 patients presented to the emergency department of our hospital following OOHCA. Only 76 (6.2 %) patients survived to discharge. The mean age of survivors was 53.7 ± 15 years. 93.7 % of OOHCA survivors had been defibrillated on-site and bystander cardiopulmonary resuscitation was carried out in 77.8 %. Acute ST-elevation myocardial infarction (STEMI) was the underlying cause of the arrest in 45 % of cases. Implantable cardioverter-defibrillators (ICDs) were inserted in 47.4 % prior to patient discharge.
Mean time since cardiac arrest was 45.3 ± 27.3 months. No patients were lost to follow-up. 85.5 % (65/76) of patients were still alive on review. 11.8 % (9/76) were diagnosed as having hypoxic brain injury. There were non-significant trends towards improved survival in patients presenting with STEMI (88.5 vs. 82.9 %). A similar finding was observed in patients with ICDs inserted prior to discharge (88.9 vs. 82.9 %). There was no difference in survival rates between patients aged 65 or older (n = 18), compared with younger survivors (83.3 vs. 85.4 % survival).
Conclusion: Once patients survive to hospital discharge, long-term survival following aborted OOHCA is excellent.

55 Utility of Highly-Sensitive Cardiac Troponin I as a Marker of Disease in Hypertrophic Cardiomyopathy

[1,2]McGorrian C, [3]Lyster S, [4]Tarrant H, [2]Codd M, [5]Doran P, [4]Fitzgibbon M, [1,6]Galvin J, [1]Mahon NG

[1]Department of Cardiology, Mater Misericordiae University Hospital; [2]UCD School of Public Health, Physiotherapy and Population Science, UCD; [3]UCD School of Biomolecular and Biomedical Sciences, UCD;

[4]Department of Clinical Biochemistry, Mater Misericordiae University Hospital; [5]UCD Clinical Research Centre , Mater Misericordiae University Hospital; [6]Department of Cardiology, Connolly Hospital Blanchardstown

Introduction: Hypertrophic cardiomyopathy (HCM) is a genetic condition characterised by cardiac muscle hypertrophy with myocyte disarray. HCM may have a clinically silent latent period during which there can be a risk of arrhythmic events. Cardiac troponin may be elevated in HCM. We examined the predictive ability of cardiac troponin I estimated by contemporary and newer highly-sensitive assays for HCM.
Methods: Nested case–control study of consecutive HCM patients and relatives who attended for HCM screening, from May 2010 to September 2011. Cases had possible or definite HCM as defined by standard Maron criteria. After informed consent, participants provided venous blood samples, and clinical features were recorded. Analyses were performed using the contemporary ARCHITECT STAT Troponin-I assay (cTnI) and high sensitive Troponin-I (hsTnI) assay on the ARCHITECT $i1000_{SR}$ (Abbott^{TM}). Associations between the natural log (ln) of cTnI and hsTnI and markers of cardiac hypertrophy were examined using Pearson's correlation coefficient and logistic regression.
Results: Complete clinical data were available on 107 patients, of whom 24 had borderline and 19 had overt HCM. Both ln(cTnI) and ln(hsTnI) were seen to have significant, positive correlations with maximal wall thickness ($r = 0.42$, $p < 0.001$, and $r = 0.51$, $p < 0.001$, respectively) and left ventricular mass ($r = 0.66$, $p < 0.001$, and $r = 0.52$, $p < 0.001$, respectively). After age and sex adjustment, the area under the receiver operator characteristic (ROC) curve for HCM was 0.78, 95 % CI (0.65, 0.90) for ln(hsTnI), and 0.66, 95 % CI (0.51, 0.82) for ln(cTnI). This difference was not statistically significant ($p = 0.11$).
Conclusions: This is the first description of a hsTnI assay in a HCM population. Both cTnI and hsTnI were shown to have a graded, positive association with measures of cardiac hypertrophy in persons with and at risk of HCM. Highly-sensitive TnI may have better discrimination for HCM than the contemporary assay, although further studies will be required to investigate this.

56 Implications of Following New NICE Guidance on pts Presenting to the Rapid Assess Chest Pain Clinic

Shevlin S, Johnston N, Dougon J

Royal Victoria Hospital, Belfast

Introduction: 8,400 patients attend a Rapid Assess Chest Pain Clinic (RACPC) in Northern Ireland yearly. The majority undergo exercise stress testing (EST) as the first-line diagnostic investigation. New guidelines released by NICE in 2010 for investigation of patients with stable anginal symptoms do not include EST in the investigation algorithm. Instead the 1st line diagnostic test is based on a risk calculation of likelihood of coronary artery disease (CAD). The diagnostic tests utilised are CT calcium scoring, functional imaging or invasive diagnostic angiography. The aim of this prospective observational study was to assess the potential impact within Belfast of implementing the updated NICE guidelines
Methods: All patients without a previous history of CAD attending the RVH RACPC between the 1st October and 31st November 2011 where included. CAD risk was calculated using tables published by NICE using their age, sex, typicality of angina pain and risk factors present. Initial investigations performed at the RACPC were recorded as well as the recommended Investigations as per NICE guidelines.
Results: 173 patients attended (50 % male) and mean age was 55 (range 30–82). Of these, 94 % underwent EST, 5 % SPECT imaging and 1 % were discharged with no investigation. Using the current algorithm no patient underwent invasive angiography or CT imaging as first line testing. Using the NICE guidelines 26 % of patients would require no diagnostic test, 21 % would require CT imaging, 27 % functional imaging and 26 % invasive angiography. Only 3 of 173 participants (1.7 %) were NICE compliant.
Conclusion: Whilst results suggest that implementation of NICE guidelines would result in the discharge of significantly more patients who require no investigation, this will be offset by a significant increase in demand for cardiac CT, functional stress testing such as SPECT or stress echocardiography and particularly invasive coronary angiography. This will have significant cost and training implications as availability of the imaging tests recommended by NICE needs to dramatically improve.

57 Pericardial Effusion Associated with Neoadjuvant Chemoradiation for Oesophageal Cancer at a Tertiary Referral Centre—An 8-year Experience

Sugrue R, Fitzgerald C, Molony P, O'Hare D, McCormack O, Ravi N, Murphy R, Daly C, Reynolds JV

Departments of Upper Gastrointestinal Surgery and Cardiology, St James University Hospital, Trinity College, Dublin

Aim: Pericardial effusion may be associated with radiotherapy for oesophageal cancer [1, 2]. This association is rarely reported, however, for patients receiving preoperative (neoadjuvant) therapy. This study examined the incidence and correlates of pericardial effusion in patients receiving standardised neo-adjuvant chemo-radiotherapy (nCRT) protocol at a tertiary oesophageal centre over 8 years.
Methods: Patients commencing nCRT between June 2003 and June 2011 were identified from an institutional oesophageal cancer registry. Clinical and demographic variables were collected, as were data on chemotherapeutic regimen, radiotherapeutic fraction size and dosages, and postoperative pathology. All pre-therapeutic and subsequent echocardiographic and computed tomography examinations were reviewed. Data were analysed using SPSS, using the 2-sample *t* test and Chi-square test as appropriate.
Results: Pericardial effusion occurred in 33 of 220 patients (15 %) receiving nCRT. All patients received either cisplatin-5 flourauracil (C5FU) or etoposide-oxaloplatin (EOX) protocols and standardised radiotherapy with a mean dosage of 40.3 Gray. None had an effusion or pericardial thickening prior to radiotherapy. Median interval from initiation of therapy to effusion was 8.5 months (range 2.9–35.6 months). Effusion occurred in 27.8 % of all patients with mid-oesophageal malignancy, compared with 12.4 % for lower oesophageal or junctional tumours ($p = 0.02$). Females appeared more likely than males to be affected [21.4 vs. 12.7 %; ($p = 0.09$)]. Pericardiocentesis was performed in 7 patients; 2 patients required pericardiectomy.
Conclusion: Pericardial effusion occurred in 15 % of patients receiving nCRT. This was significantly associated with mid-oesophageal tumours ($p < 0.05$), and approached significance in females. Although medical (3.2 %) and surgical (0.9 %) interventions are rare, the study suggests that prospective studies of cardiac/pericardial consequences of nCRT should be encouraged.
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Session 8: Electrophysiology/General Cardiology

58 A Comparative Cost Impact Study of Diamond Forrester and Coronary Calcium

McKavanagh P, Lusk L, Ball P, Trinick T, Duly E, Walls G, Harbinson M, McQuillan CL, Shevlin S, Alkali M, Donnelly P

Department of Cardiology, Ulster Hospital, Dundonald, Belfast

Objective: To determine the accuracy and cost impact of the diamond forrester (DF) and calcium score (CS) pathways proposed by NICE clinical guideline 95 (CG95).
Method: This was a sub-study of the Cardiac CT for the Assessment of Chest Pain and Plaque (CAPP) study, a larger randomised control trial (ISRCTN52480460), evaluating the cost-effectiveness of cardiac CT in stable patients. The CAPP study recruited 500 participants referred to NHS Rapid Access Chest Pain Clinics with suspected coronary artery disease. This work involved the 250 patients randomised to the CT arm of the CAPP study. The total number and cost for initial and further investigations was determined theoretically by two models. Model A used the DF criteria and Model B the CS criteria.
Results: Of the 250 patients, 4 withdrew. 140 (57 %) patients were male. The mean DF was 47.8 and mean CS 172.5. Of the 52 patients that had a DF score of 0–9 % 1 (1.9 %) had severe disease and of the 91 that had a DF >60 % 17 (18.7 %) had no CAD. Of the 126 patients that had a CS of zero 2 (1.6 %) patients had severe disease and of the 26 patients with a CS >400 only 4 (15.4 %) did not have severe disease. A Kendall's Tau-c (τc), rank correlation coefficient was performed with CS showing a better correlation ($\tau c = 0.768$, SE = 0.026) withCAD compared to the DF ($\tau c = 0.44$, SE = 0.047). In the costing analysis CS proved to be less expensive in all scenarios considered.
Conclusions: The use of CS to triage all patients appears to be more economical and accurate for the prediction of CAD and prevents unnecessary downstream testing.

59 Routine Trans-oesophageal Echocardiography Directed Cardioversion in Patients with Atrial Fibrillation Treated with Dabigatran–a Single Centre Experience

Kennedy MW, Waterhouse DF, Sheahan R, Gumbrielle T, Foley DF, McAdam BF

Dept of Cardiology, Beaumont Hospital, Dublin

Introduction: Increased risk of cardio-embolic events following direct current cardioversion (DCCV) is well recognised. According to guidelines and observational studies, Warfarin is required for at least 3 weeks before, and a minimum of 4 weeks after cardioversion because of the risk of thrombo-embolism. Indeed transopesophageal echocardiogram (TOE) to exclude thrombus does not preclude embolism afterwards. With new anti-coagulants such as Dabigatran, limited clinical trial experience suggests that this strategy is possible and safe but the monitoring of anti-coagulant status is not possible. Our institution adopted a pre DCCV TOE policy for all patients on this agent. We present the findings of our cohort of patients on Dabigatran who underwent a day case TOE guided DCCV and its effect on coagulation indices.
Methods: In total 43 patients were pre treated with a minimum of 4 weeks of Dabigatran at the appropriate dose underwent day case TOE guided DCCV. All patients underwent a thorough evaluation of their left atrium and appendage and assessment of LAA velocities by Pulse Wave (PW) Doppler. TOE negative patients underwent DCCV on that day.
Results: Of the 43 patients (mean age 67.38 ± 9.76, males 33; females 10) no patient was found to have a LAA thrombus and all were able to proceed to DCCV. The mean LAA exit velocities in this group were 41.66 ± 16.06 cm/s, mean PT 18.95 ± 3.36, mean APTT 55.22 ± 8.54 and mean INR 1.61 ± 0.37. No patient experienced any adverse clinical neurological events after routine 6 weeks of follow up.
Conclusion: Despite the inability to monitor Dabigatran, providing compliance to medication prior to DCCV, no patient was found to have a LAA thrombus or adverse neurological event in follow up. Anticoagulation indices may indicate drug effect but are unreliable markers of therapeutic effectiveness.

60 A Pilot Study on Renal Sympathetic Denervation for Resistant Hypertension in the West of Ireland

Kalyar I, Gleeson J, Lappin D, Crowley J, Nash P, MacNeill B, Daly K, Sharif F

Cardiology Department, Galway University Hospitals, Galway

Objective: Renal Sympathetic Denervation (RSD) is a novel, device-based intervention for the management of resistant essential hypertension (RH). Here we present the data from our initial experience of renal artery denervation for the first 12 patients.
Methods: All patients in this pilot study (n = 12) had RH, and were on a minimum of 3 medications. The effect of RSD on office blood pressure, 24 h ambulatory blood pressure, number of anti-hypertensive medications, renal function, weight, serum uric acid concentration, excretory fraction of sodium, and renin-aldosterone levels was investigated. We also assessed the safety of the procedure. Prior to intervention secondary causes of hypertension were excluded, and detailed anatomy of the renal arteries was obtained using either CT or MR angiography. Patients were followed up at 2 weeks, 2 months and 6 months for serum biochemistry, urinalysis and office BP. Ambulatory BP was assessed pre- and 2 months post RSD.
Results: At 2 months the average decrease in office BP was 33/15 mmHg (systolic $p = 0.04$, diastolic $p = 0.03$), while the observed reduction in 24 h ambulatory BP readings was 26/16 mmHg (systolic $p = 0.01$, diastolic $p = 0.01$). The range in change of serum creatinine values at 2 months was -10 to +13 μmol/L, and the average change was +1.5 μmol/L ($p = 0.47$). There was a 6.6 % reduction in mean uric acid concentration ($p = 0.371$). A trend towards weight loss, with an average reduction in weight of 1.65 kg at 2 month follow up was seen ($p = 0.27$). Patients required, on average, 1.3 medications less at follow up. There have been no major complications to date.
Conclusion: RSD was safe, and effective at reducing both systolic and diastolic blood pressure in patients with RH. No acute

deterioration in renal function was demonstrated. Findings from this pilot study showed more substantial reductions in ambulatory BP consistent with larger studies.

61 ABC for Life: a Programme of BLS Training to Primary School Children in Northern Ireland Since 2004

Mc Grath P, Laverty L, Toner P, Connolly M

'ABC for life' charity committee, Queen's University Belfast, Northern Ireland

The ABC for Life programme is a regional course in basic life support (BLS) training in Northern Ireland specifically designed for 10–12 year old children. It was set up in 2004 by a team of dedicated medical students and the Division of Medicine at Queens University Belfast (QUB).

Medical students are trained as instructors of BLS and subsequently attend primary schools and education training boards to instruct teachers how to train their pupils. A bank of trained medical student instructors is in constant use, supervised by two student coordinators. The scheme is overlooked by the ABC for life committee including postgraduate doctors and representatives from the Division of Medicine at QUB.

Resource packs (DVDs of a cardiac arrest situation, a simple faint requiring recovery position, communication with ambulance control, an instruction manual and a training manikin) are provided to each school to retain for future training sessions. Refresher courses are offered yearly. A dedicated website via QUB is in use for teachers to access resources and contact the coordinators if needed.

We have previously shown that children trained through his unique training programme showed a highly significant increase in knowledge following the training session, which remained higher than non-trained pupils at 6 months following training [1, 2]. An official charity status has been granted and the charity committee continue to raise funds to purchase equipment.

By using medical students and teachers, a large number of children can be trained. To date, the programme has trained and provided resources to approximately 300 schools in Northern Ireland. With an average primary school class containing 25 pupils, we estimate that 7,500 pupils have been trained. We plan to continue training, provide refresher courses and expand our training to include use of an automated external defibrillator (AED).

References

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62 Initial Experience with Vernakalant for Rapid Conversion of New Onset Atrial Fibrillation

Abidin NZ, Waterhouse DF, Foley D, Sheahan RS, McAdam B

Department of Cardiology, Beaumont Hospital, Dublin

Introduction: Intravenous vernakalant is an atrial-repolarization-delaying agent, approved for the rapid conversion of recent-onset atrial fibrillation (AF) to sinus rhythm (SR). Vernakalant blocks atrial-specific potassium and sodium ion channels, slowing atrial conduction, without promoting ventricular arrhythmia. The aim of this study was to assess the safety and effectiveness of vernakalant for the acute conversion of recent-onset AF.

Methods: Patients with new onset AF <48 h, eligible for cardioversion, were enrolled over a 6 month period. The inclusion criteria included preserved left ventricular function, no concurrent acute coronary syndrome or use of class III anti-arrhythmic drugs and no obvious precipitant of AF. All the patients enrolled in this study received a 10-min intravenous infusion of vernakalant (3 mg/kg). If, after a 15-min observation period, AF was still present, a second 10-min infusion of intravenous vernakalant (2 mg/kg) was given. The primary end point was conversion to SR within 90 min.

Results: Twenty (male n = 14, female n = 6) haemodynamically stable patients with AF received intravenous vernakalant. Mean age of the population was 63 years. The primary end-point of conversion to SR within 90 min was achieved in 95 % of patients (n = 19), with a median time to conversion of 62 min. Transient side effects included nausea (35 %, n = 7) and sneezing (20 % n = 4). Mild hypotension was seen in 55 % (n = 11) with a mean fall in systolic BP of 16 mmHg. There were no significant side effects requiring discontinuation of the infusion. No ventricular arrhythmias were associated with this treatment strategy in the studied population.

Conclusion: Vernakalant rapidly converted recent-onset AF to SR, was well tolerated, and may be a valuable therapeutic strategy for reestablishing SR in patients with recent-onset AF.

63 Current Use of Oral Anticoagulation in Atrial Fibrillation Patients

Morgan RB, Mahon C, Sugrue R, Lynch M, Blennerhassett L, Curtin E, McMahon G, Murphy RT, Mulvihill N, Foley B, Crean P, Daly CA

St James's Hospital, Dublin

Background: Atrial fibrillation (AF) is associated with significant morbidity and mortality, particularly stroke. Consequently a critical component of the management of atrial fibrillation is the prevention or embolic complications through anticoagulation. The advent of multiple novel anticoagulants in recent years has led us to question the actual use of existing oral anti-coagulation (OAC) agents in practice.

Methods: Prospective observational study in a Dublin university teaching hospital. Consecutive patients over 2 months with AF detected on admission ECG or on telemetry during hospital stay were included and patient demographics, clinical details, inpatient treatments and discharge medications are presented. CHADS and CHADSVASC scores were calculated for all patients and patient were categorised into two groups, OAC indicated or OAC not indicated based on CHADSVASC score ≥ 2 or <2.

Results: During the study period 169 patients who presented to ED or were admitted to hospital had AF. Mean age 75 (± 11); 49 % male. Clinical type of AF 18 % new, 17 % paroxysmal, 8 % persistent, 52 % longstanding persistent and 5 % unknown. At presentation 76/169 (45 %) of patients were on oral anticoagulation. The mean CHADS score in our population was 2.41 and CHADSVASC was 4. OAC status at discharge is shown on Table 1. INR measurements in the ED revealed 17/77 (22 %) of patients on warfarin were subtherapeutic at presentation; 46/77 (60 %) were within target range; 7

(9 %) had an elevated INR and 7 (9 %) had no INR recorded. No patients received noncoumarin-based novel oral anticoagulant agents.

Table 1 OAC prescribing patterns

Warfarin prescribing	% age of patients
Not indicated, not prescribed	11
Not indicated, prescribed	0
Indicated, not prescribed, no reason documented	14
Indicated and prescribed	52
Previous major bleed on OAC	2
Indicated but decision made by team against OAC based on perceived unsuitability	16
Patient died	5

Conclusion: No patients were inappropriately anti-coagulated and none received novel non-coumarin based OAC. However, despite high CHADSVASC scores in our population only 52 % of patients were on OAC at discharge. Why this proportion is so low, and why the proportion of patients perceived to be unsuitable for anticoagulation is so high deserve further study and may have important implications for routine use of novel anticoagulation agents in AF.